

CHAPTER 3 AFFECTED ENVIRONMENT

3.1 INTRODUCTION

This chapter describes the existing conditions for Bureau of Land Management (BLM) resources, resource uses, special designations, and the socioeconomic environment within the Richfield Field Office (RFO) planning area. Management of resources and resource uses on public lands administered by the BLM is directed by a variety of laws, regulations, policies, and other requirements. The affected environment is used as the baseline of existing conditions against which the impacts of the different alternatives are analyzed and compared in Chapter 4.

3.2 OVERVIEW OF THE PLANNING AREA

The planning area encompasses 5.4 million acres in Sanpete, Sevier, Piute, and Wayne counties, and portions of Garfield County. There are also 21,500 acres of Kane County within the planning area. However, these acres lie entirely within Glen Canyon National Recreation Area (NRA) so no decisions within this RMP will affect those lands. Within this area BLM manages 2.1 million acres of public land surface and mineral estate, and an additional 95,000 acres of split estate lands (Federal minerals where the surface estate is in state or private ownership). The BLM also has administrative responsibility for 2,082,865 acres of mineral estate where the surface is managed by other Federal agencies (U.S. Forest Service and National Park Service [NPS]). Noted geographic features of the RFO include the Henry Mountains, Parker Mountain, Fremont River, Dirty Devil River, Gilbert Badlands, and Factory Butte. Acreage calculations used in this chapter and elsewhere in this document reflect current data in BLM's geographic information system (GIS) and may differ from acreages displayed in older documents, calculated by other methods. In this document, the term "planning area" applies to all lands within the five-county area, regardless of surface ownership. The term "Richfield Field Office" (RFO) applies only to the BLM-administered public lands and resources within the planning area. All acres in text and tables represent surface acres unless otherwise noted.

3.2.1 Physiography

The planning area is located primarily in south-central Utah and lies almost entirely within the Colorado Plateau and the Colorado Plateau-Basin and Range Transition physiographic provinces (Hunt 1974, Stokes 1986), except for a small portion of northern Sanpete County, which is within the Middle Rocky Mountains province.

As shown on Map 3 of the Mineral Potential Report (BLM 2005b), the eastern part of the planning area is in the Colorado Plateau province. This province is characterized by relatively flat-lying sedimentary strata uplifted to elevations between 5,000 and 10,000 feet above sea level, and that are predominantly Paleozoic to Mesozoic in age. In places, the strata are deeply incised as canyons; in others they are relatively broad bench lands. Strata in the eastern part of the planning area are intruded by igneous rocks that form the Henry Mountains.

The western part of the planning area is in the Colorado Plateau-Basin and Range Transition Zone. This province has similarities to the Colorado Plateau to the east and to the Basin and Range to the west. Similar to the Colorado Plateau, the sedimentary strata in the Transition Zone are relatively flat-lying. Similar to the Basin and Range, the physiography of the Transition Zone includes fault-bounded, north-trending ranges, which are separated by valleys. In addition, the Sevier and Sanpete Valleys and adjacent ranges are part of one of the world's classic fold-and-thrust belts (DeCelles and Coogan 2006). Many of

the ranges are capped by Tertiary volcanic rocks. One of the largest volcanic fields in the United States is the Marysvale Volcanic Field, which includes the Tushar Mountains and parts of adjacent plateaus.

The southern end of the Middle Rocky Mountains province extends into the northern highlands of Sanpete County along the drainage divide between the Spanish Fork and San Pitch rivers. Rocks in the area include Upper Cretaceous and Tertiary strata similar to those present in the Colorado Plateau to the east, along with Middle Tertiary volcanic deposits of the Moroni Formation.

3.2.2 Topography and Drainage

Overall, elevations across the planning area range from a high of 12,173 feet on Mount Delano, located on the crest of the Tushar Mountains in the Fishlake National Forest, to a low of around 3,700 feet on Lake Powell in Glen Canyon National Recreation Area. Mountain summits are typically 9,000 to 11,000 feet in elevation, with valley bottoms at 5,000 feet. The Green and Colorado Rivers drain the eastern portion of the planning area, whereas areas to the west have internal drainage to either the Sevier or Utah Lake basin. The Sevier River, which drains most of the western portion of the planning area, discharges to Sevier Lake.

3.3 PHYSICAL, BIOLOGICAL, AND CULTURAL RESOURCES

3.3.1 Air Quality

This section describes the climate and existing air quality in the region potentially affected by alternatives described in Chapter 2. Air pollutants addressed in this Environmental Impact Statement (EIS) include criteria pollutants, hazardous air pollutants and compounds that could cause visibility impairment or atmospheric deposition. Regional air quality is influenced by the interaction of several factors, including meteorology, climate, the magnitude and spatial distribution of local and regional air pollutant sources, and the chemical properties of emitted air pollutants. Elements of air quality addressed in this analysis include ambient air quality concentrations, visibility, and atmospheric deposition. Chapter 3 of the Management Situation Analysis (MSA) contains detailed information concerning air quality (BLM 2004a).

3.3.1.1 Climate

The climate of the planning area is variable and influenced by the complex topography of the region. Landforms that influence local weather include the Orange Cliffs and flat desert around Hanksville and the more complex mountainous areas of the Henry Mountains, Boulder Mountains, and the Southern High Plateaus.

Elevation within the RFO ranges from about 4,000 feet in the lower valleys to more than 11,500 at the top of Mount Ellen, in the Henry Mountains. The climate is a generally semiarid continental regime characterized by low relative humidity, abundant sunshine, and low to moderate precipitation. Below-normal precipitation and drought are common occurrences. The annual precipitation range is generally less than 5 inches in the lower elevation areas and up to 30 inches or more at the higher elevations. A uniform distribution of precipitation occurs from October through May, averaging a little more than an inch per month. June through September is slightly drier, with an average of about 0.8 inches per month. Moisture evaporation is high because of low humidity, high temperatures, and winds. Map 3-1 presents the average annual precipitation (AAP) for the RFO. Average maximum temperatures in the area range from 98°F in July to 37°F in January. Average minimum temperatures range from 7°F in January to 61°F

in July. The average frost-free period is 130 days at the lower elevations but drops to about 60 days at the higher elevations (Western Regional Climate Center).

Summers are characterized by hot weather in the lower valleys, where maximum temperatures of more than 100 degrees occur during most years at elevations of less than 5,500 feet. Winters are cold, and subzero minimum temperatures are recorded several times a year in most areas at lower elevations.

Snowfall usually is light, commonly less than 10 inches per year at the lower elevations, but occasional storms deposit as much as 2 feet of snow. Snowfall accumulates to an estimated 100 inches or more on the higher mountain slopes.

Strong temperature inversions persist in the lower valleys, and they frequently extend to about 1,000 feet above the valley floors. Above the top of the inversions, temperatures decrease about 3.5 degrees per 1,000-foot increase in elevation.

3.3.1.2 Ambient Air Quality Standards

The Clean Air Act (CAA) Amendment of August 7, 1977 (Section 160) identifies the following air quality areas:

- Class I—the most restrictive class applies to areas in which practically any change in air quality would be considered significant.
- Class II—applies to areas in which deterioration normally accompanying moderate, well-controlled growth would be considered insignificant.
- Class III—applies to areas in which deterioration to ambient standards is allowed.

Most of the RFO and all of the lands managed by the BLM are generally classified as a Class II air quality area (40 Code of Federal Regulations [CFR] Part 81.345). There are five Class I areas in close proximity or within the boundaries of the planning area: Capitol Reef National Park and a portion of Canyonlands National Park are within the planning area boundary; and Arches National Park, Bryce Canyon National Park, Zion National Park, and the remainder of Canyonlands National Park are located adjacent or near the planning area (Map 3-2). Protection of air quality in these Class I areas may require additional mitigation or protection measures to avoid potential impacts from BLM authorized activities.

Overall air quality in the RFO is good. Based on the region's remoteness, low population, limited industrial development and a lack of major urban communities, counties in the planning area are designated as "attainment" or "unclassifiable" with respect to National Ambient Air Quality Standards (NAAQS) for all criteria pollutants. As of May 2006, the air quality in the planning area has not been designated as "non-attainment" for any criteria pollutant. In addition, based on the 2006 Division of Air Quality Annual Report, the area is likely to be in attainment with respect to the new particulate matter (PM) 2.5 standards enacted in September of 2006, although the final determination has not yet been made (UDAQ 2007).

The air pollutant of most concern on public lands that could affect the Class I areas is particulate matter, which may originate from fire, fugitive dust, or vehicle use. Air resources are affected predominantly by existing concentrations of various pollutants and the climatic and meteorological conditions. Map 3-2 shows the Class I air quality areas within and adjacent to the planning area.

3.3.1.3 Existing Air Quality

The Utah Division of Air Quality (UDAQ) is responsible for monitoring air quality in Utah. Measurements are typically taken in urban areas where ambient pollution levels are expected to be the highest. As a result of the good air quality and the lack of potential factors that could influence a change in air quality levels, the State of Utah does no routine monitoring in the lands managed by the RFO. The National Park Service monitors its Class 1 areas for ambient air quality and air quality related values such as visibility. Based on existing data, air quality in the planning area is generally good to excellent due primarily to low population numbers and limited industrial development. The existing good air quality is typical of a largely undeveloped region in the Western United States. Regional concentrations of SO₂, PM₁₀, and nitrogen oxides (NOx) are generally well below the NAAQS. No major air pollution sources are found nor have polluted airsheds been identified within the planning area.

3.3.1.4 Sources of Air Pollution

Based on UDAQ annual reports and emission inventories from 1996 to the present the following conclusions regarding pollution sources within the RFO can be made:

- There are no major sources of air pollution in the planning area, especially when compared to more urban counties within the state.
- Sevier County has the greatest emissions from point sources within the RFO, although all counties have at least one point source identified.
- Based on emissions inventories, the primary air pollutant in the planning area is volatile organic compounds (VOC) followed by carbon monoxide (CO), PM₁₀, NOx, and SO₂.
- Area sources (emissions from agricultural activities, wildland and prescribed fire, small industry, etc.), biogenic emissions (these are emissions from decaying vegetation and soils), and on-road mobile sources are generally the greatest contributors to emissions in the RFO.

3.3.1.5 Prescribed Burning

The Environmental Protection Agency (EPA) notes in the Regional Haze Regulations (USEPA 1999) that fire emissions have a natural and a manmade component. The EPA also recognizes that all kinds of fire (wildfire, prescribed fire, etc.) contribute to regional haze, and a complex relationship exists between what is considered a natural source of fire versus a human-caused source of fire. For example, the increased use of prescribed fire in some ecosystems may lead to PM emissions levels lower than those that would be expected from wildfire. Given that the purpose of prescribed fire in many instances is to restore natural fire cycles to ecosystems, the EPA believes it would be appropriate to consider some portion of prescribed fire as “natural.” BLM currently cooperates with the UDAQ for smoke management and works to implement the Utah State Implementation Plan for Regional Haze (UDAQ 2004) and the smoke management plan (UDAQ 2003) in order to minimize man-made sources of emissions from prescribed fire activities.

3.3.1.6 Visibility

Visual resources are one of the most socially and economically important resources in the RFO. In August 1977, the Congress amended the CAA to establish as a national goal “the prevention of any future, and the remedying of any existing, impairment of visibility in mandatory Class I Federal areas which impairment results from manmade air pollution” (42 USC §7491(a)(1)). The 1977 Amendments also included provisions requiring applicants for new major source permits to assess the potential for their projects to cause adverse impacts on the air quality-related values, including visibility, in nearby Class I

areas. In July 1999, the EPA published the Regional Haze Rule (40 CFR 51.300-51.309). This regulation established a program for the improvement and protection of visibility in the 156 protected Class I parks and wilderness areas, including the establishment of baseline and current visibility conditions and the tracking of changes in visibility conditions over time. Utah Air Conservation Rule R307-406 defines an adverse impact on visibility as “visibility impairment which interferes with the management, protection, preservation, or enjoyment of the visitors’ visual experience of a mandatory Class I area.” Any new major source or major modification must be reviewed for the impact of its emissions on visibility in any mandatory Class I area. UDAQ is currently updating the Regional Haze SIP approved by EPA and adopted by the State in 2003 and codified in state law in 2004 (R307-110-28). This includes the enhanced smoke management plan as well.

The Colorado Plateau in the Four Corners States of the Southwest is one of the most intensively monitored areas in the EPA/NPS’ IMPROVE Network (Interagency Monitoring of Protected Visual Environments). Based on data from the IMPROVE Network, the Colorado Plateau portions of the RFO are one of the regions with the lowest amounts of haze. Atmospheric visibility is generally quite good. Visual-range estimated measurements made by the NPS and the BLM show a mean visual range of 125 to 175 miles. The mean annual visual range is about 150 miles; however, visual ranges can vary extremely from one-quarter to more than 300 miles during the year. The good visibility is the result of low regional sulfur dioxide and ambient suspended particulate concentrations (EPA and NPS 2007).

3.3.2 Soil Resources

Soil data and associated ecological site descriptions are used in evaluating the site’s potential productivity and are critical to rangeland health evaluations as well as to determining impacts of various management activities. Soil erosion is one indicator of rangeland health. Soil surveys have been completed for about three-quarters of the planning area, although some surveys are over 20 years old. Published surveys include Fairfield-Nephi Area (1984), Millard County, East (2003), Sanpete Valley (1981), and the Henry Mountains Area (1990). The National Resources Conservation Service (NRCS) is currently revising the survey for Sevier County. Piute County and the western portion of Wayne County lack soil surveys and ecological site inventories.

3.3.2.1 Soil Resource Condition

Soil composition is one factor that determines vegetation growth and wildlife habitats. Soil types also influence water quality, salinity, and erosion throughout the planning area. BLM considers impacts of various management decisions on soils and related impacts to salinity control, water quality, and erosion. A comprehensive inventory of the condition of soil resources has not been conducted across the planning area, although rangeland health assessments and other site-specific project monitoring reports may contain some of this kind of information. This section provides an overview of the general soil resource concerns in the RFO.

Soil management problems may arise in the lands managed by the RFO depending on a combination of factors, including soil type, climate, geologic setting, vegetative cover, and how the resources are impacted by multiple uses (e.g., recreation, mineral development, grazing). Vegetation is sparse in some of the planning area because of high salinity, a short growing season, and distribution of effective moisture in some soils. Erosion and compaction are two important factors of concern in the planning area. Several areas in the planning area contain soils that are considered to be highly susceptible to wind and water erosion.

Vehicle traffic, herbivore trampling, foot traffic, or any activity that repeatedly causes an impact on the soil surface can cause a compaction layer (Chanasyk and Naeth 1995, Cole 1985, and Thurow *et al.*

1988). Compaction becomes a problem when it begins to limit plant growth, water infiltration, or nutrient cycling processes (Wallace 1987, Willat and Pullar 1983, Thurow *et al.* 1988, Hassink *et al.* 1993). Moist soil is more easily compacted than dry or saturated soil (Hillel 1998).

Soils developed on marine formations are high in gypsum and other salts. High concentrations of these salts at or near the soil surface limit the types and amounts of vegetation present. Badland and gypsum land, which are natural sources of large amounts of salt and sediment, often lack significant vegetation cover but frequently have a thin protective layer such as rock fragments, and/or soil crusts (physical and/or cryptobiotic) that provide some stability. Surface disturbance in these areas may result in an increased potential for erosion.

Biological soil crusts can be an important ecological component to the stability of certain soil and plant communities. There are areas in the eastern portion of the RFO on the Colorado Plateau that currently contain biological soil crusts as a component of the community. There are no inventories of the spatial extent or the condition of the soil crusts within the RFO. The standards and guidelines portion of the Fundamentals of Rangeland Health and Standards and Guidelines for Grazing Administration (43 CFR Subpart 4180) and Utah's Standards for Rangeland Health and Guidelines for Management (BLM 1997) compare current soil crust cover to that identified in the ecological site descriptions to determine if current management strategies are meeting standards.

Salt and sediment yield is of major concern in the Colorado River Basin, and erosion from public lands is an important source of sediment and associated salts in the area. Some of this yield is natural or results from relatively stable conditions in an arid or semiarid climate with periodic high-intensity storms and active erosion. The actual contribution of salt and sediment yield to the total Colorado River Basin from drainages in the planning area is unknown. The Colorado River Salinity Control Act guides actions in watersheds of the Colorado River Basin.

3.3.3 Water Resources

The United States is divided and sub-divided into successively smaller hydrologic units which are classified into four levels: regions, sub-regions, accounting units, and cataloging units. In general terms, a hydrologic unit can be defined as any geographic area where water within the area naturally drains to a specific outlet. The hydrologic units are arranged within each other, from the smallest (cataloging units) to the largest (regions).

The first level of classification divides the Nation into major geographic areas, or regions. These geographic areas contain either the drainage area of a major river, such as the Upper Colorado River region, or the combined drainage areas of a series of rivers, such as the Texas-Gulf region, which includes a number of rivers draining into the Gulf of Mexico. The second level of classification divides the regions into sub-regions. A sub-region includes the area drained by a river system, a reach of a river and its tributaries in that reach, a closed basin(s), or a group of streams forming a coastal drainage area. The third level of classification subdivides many of the sub-regions into accounting units, while the fourth level of classification is the cataloging unit, the smallest element in the hierarchy of hydrologic units. A cataloging unit, which is roughly equivalent to a local watershed, is a geographic area representing part or all of a surface drainage basin, a combination of basins, or a distinct hydrologic feature (USGS no date).

The planning area lies within portions of 11 separate watersheds located in the Upper Colorado Hydrologic Region and the Great Basin Hydrologic Region. The RFO is located within both the Colorado River Hydrologic Basin and the Great Basin Hydrologic Region. The Henry Mountains portion of the RFO is located in the Upper Colorado River Sub-basin of the Colorado River Basin, whereas most of the Mountain Valley portion of the RFO is located in the Sevier River Sub-basin of the Great Basin

Hydrologic Region. The northernmost portions of the RFO are contained in the Jordan River/Utah Lake Sub-basin of the Great Basin, and the easternmost extent of the Mountain Valley area is located in the Upper Colorado River Sub-basin. The RFO contains 120 perennial streams (see Table 3-1) and a larger number of intermittent streams.

Table 3-1. Perennial Stream Segments – Richfield Field Office

Antimony Creek	Ax Handle Canyon Creek	Beaver Creek
Benson Creek	Big Hollow Creek	Birch Creek
Box Creek	Brimhall Springs Creek	Brine Creek
Browns Creek	Bullberry Creek	Bull Creek
Bullfrog Creek	Bullfrog Creek North Fork	Burr Creek
Burro Creek	California Gulch Creek	Carcass Creek
Cass Creek	Cedar Creek	Coal Mine Wash
Coaly Wash Stream	Copper Creek	Copper Springs Creek
Cottonwood Creek	Cottonwood Wash	Cow Creek
Crescent Creek	Dark Canyon Creek	Daves Fork
Deep Creek	Deer Creek (Mitchel Creek)	Dirty Devil River
Divide Canyon Creek	Dry Canyon Creek	Dry Creek
Dugout Creek	Fish Creek	Fremont River
Government Creek	Granite Creek	Greenwich Creek
Halls Creek	Hansen Creek	Happy Canyon
Hells Kitchen Canyon Creek	Hogg Canyon Creek	Holt Draw
Hoodle Creek	Ivie Creek	Larrys Fork
Left Hand Fork Ax Handle Creek	Little Table Creek	Lost Creek
Maidenwater Creek	Manning Creek	Maple Canyon Creek
Maple Creek	Milk Creek	Mill Creek
Mt. Ellen North Fork Creek	Mt. Ellen South Fork	Mud Creek
Muddy Creek	Muley Creek	North Wash
North Wash South Fork	Oak Creek	Oak Spring Creek
Otter Creek	Pennell Creek	Peterson Creek
Petes Canyon Creek	Pine Creek	Pistol Creek North Fork
Pistol Creek South Fork	Pleasant Creek	Poison Creek
Poison Spring	Pole Canyon Creek	Praetor Canyon Creek
Quaking Aspen Creek	Quitcupah Creek	Quitcupah Creek North Fork
Raggy Canyon Creek	Reese Creek	Riley Canyon Creek
Road Creek	Robber's Roost Canyon	Saleratus Creek
Salt Wash	Sand Creek	Sandy Creek
San Pitch River	Sevier River	Sevier River East Fork
Skumtumpah Creek	Slate Creek	South Creek
South Willow Creek	Speck Creek	Spring Branch
Spring Creek North Fork	Starr Creek	Straight Creek
Sulphur Creek	Sulphur Creek Tr. Pleasant	Sweetwater Creek
Swett Creek	Swift Spring Creek	Tenmile Creek
Thompson Creek	Threemile Creek	Ticaboo Creek
Timber Canyon Creek	Trachyte Creek	Twin Corral Box Canyon
Water Creek	Water Hollow Creek	Wild Horse Creek
Willow Patch Creek	Willow Spring Creek (Forest Creek)	Yogo Creek

The majority of the streams in the RFO, whether perennial or intermittent, originate at higher elevations on National Forest or BLM lands and flow through private and BLM-administered lands. Many of these streams are characterized by steep streambed gradients and are subject to flooding during rapid snowmelt or high-intensity thunderstorms. As the perennial streams run through public lands, they provide water for livestock, wildlife, fisheries, and downstream irrigation.

Some intermittent and ephemeral streams in the area yield water during periods of spring snowmelt or intense thunderstorm activity. However, much of the water in most of these streams is used for irrigation and does not reach the major rivers.

The Sevier River and its tributaries are regulated by storage reservoirs. Because of this, the Utah State Engineer must approve changes to any water regime. A considerable amount of water from the snowmelt period is stored and then released from July to September. Lakes and reservoir storage facilities are an important part of the water resource scheme. Major reservoirs in the area include Otter Creek, Koosharem, Piute, Willow Creek, Gunnison, and Sevier Bridge Reservoirs.

Springs, seeps, and wells in the area provide high-quality water for domestic and livestock use.

3.3.3.1 Water Quality

Baseline surface water quality within the planning area is influenced by the geology and soil with which the water has been in contact. Water quality also varies depending on flow conditions. Human induced impacts in the planning area, such as changes in thermal and turbidity conditions in water bodies and impacts from increased salinity, heavy metals, and nutrients from irrigation or other discharges also affect baseline water quality. Surface water quality impacts within the planning area may be associated with agricultural runoff, road maintenance, removing riparian vegetation, channel modification, stream bank destabilization, atmospheric deposition, resource extraction, oil and gas activities, urban runoff and grazing activities.

Table 3-2 lists the impaired stream and river segments located within the RFO, listed on Utah's 2006 303(d) list of impaired waters (Appendix 4). Table 3-3 lists the lakes and reservoirs located within the planning area needing total maximum daily load (TMDL) analysis. TMDL is a calculation of the maximum amount of a pollutant that a water body can receive and still meet water quality standards, and an allocation of that amount to the pollutant's sources. Water quality standards are set by the state. The State identifies the uses for each water body, for example, drinking water supply, contact recreation (swimming), and aquatic life support (fishing), and the scientific criteria to support that use. A TMDL is the sum of the allowable loads of a single pollutant from all contributing point and non-point sources. The calculation must include a margin of safety to ensure that the water body can be used for the purposes the state has designated. The calculation must also account for seasonal variation in water quality. The Clean Water Act, Section 303, establishes the water quality standards and TMDL programs.

Table 3-2. Utah's 2004 303(d) List of Impaired Stream and River Segments Requiring a TMDL Analysis

Water Body Name	Water Body Description	Causes
East Fork Sevier River	East Fork Sevier River and tributaries from confluence with Sevier River upstream to Antimony Creek confluence, excluding Otter Creek and tributaries	Temperature Total phosphorus
Lost Creek	Lost Creek and tributaries from confluence with Sevier river upstream about six miles	Total Dissolved Solids (TDS)
Sevier River	Sevier River from Clear Creek confluence to HUC unit boundary	Temperature
Peterson Creek	Peterson Creek and tributaries from confluence with Sevier River to USFS boundary	TDS
Lower Ivie Creek	Ivie Creek and tributaries from confluence with Muddy Creek to U-10 highway	TDS

Water Body Name	Water Body Description	Causes
San Pitch River	San Pitch River and tributaries from beneficial U132 to Pleasant Creek confluence excluding Cedar Creek, Oak Creek, Pleasant Creek, and Cottonwood Creek	Temperature

Table 3-3. Lakes and Reservoirs within Planning Area Identified as Needing TMDL Analysis

Water Body Name	Water Body ID	Pollutant
Piute Reservoir	UT-L-16030001-011	Total phosphorus
Nine Mile Reservoir	UT-L-16030004-001	Total phosphorus Dissolved oxygen
Otter Creek Reservoir	UT-L-16030002-004	Total phosphorus
Koosharem Reservoir	UT-L-16030002-011	Total phosphorus

Source: UDEQ 2006

As surface water quality decreases, the ability of aquatic animals and plants to maintain themselves diminishes. Stressors associated with increasing temperatures, lower dissolved oxygen levels, changing pH, and smothering from sediments adversely impact the aquatic ecosystem and diminish the ability of surface waters to sustain baseline conditions.

3.3.3.2 Drinking Water

Several municipal water sources and associated watersheds originate on public lands. BLM coordinates with local communities to protect and allow appropriate development of municipal water resources. Table 3-4 lists the culinary water sources located on public lands within the planning area.

Table 3-4. Culinary Water Sources on Public Lands

Name of Water User	Location and Source
William Murray	T. 27 S., R. 3 W., Section 7 - Spring
Town of Kingston	T. 30 S., R. 3 W., Section 24 - Spring
Utah Division of Water Resources (Town of Greenwich)	T. 27 S., R. 1 W., Section 35 - Spring
Town of Annabella	T. 24 S., R. 2 W., Section 19 - Spring
Utah Division of Water Resources (Town of Lyman)	T. 27 S., R. 3 E., Section 35 - Spring T. 28 S., R. 3 E., Sections 3 and 4 - Spring
Town of Bicknell	T. 28 S., R. 3 E., Section 25 - Spring T. 29 S., R. 3 E., Section 3 - Spring
Town of Loa	T. 28 S., R. 2 E., Section 3 - Spring and Well
Town of Sigurd	T. 23 S., R. 1 W., Section 6, 21, and 28 - Springs
Kings Meadow Ranches	T. 23 S., R. 1 W., Section 28 - Spring
City of Aurora	T. 22 S., R. 2 W., Sections 1 and 6 - Springs
Caineville Special Service District	T. 28 S., R. 8 E., Section 33 - Well
Town of Koosharem	T. 26 S., R. 1 E., Section 30 - Spring
Town of Hanksville	T. 29 S., R. 11 E., Section 1 - Well
Town of Antimony	T. 31 S., R. 2 W., Section 19 - Spring
Utah Dept. of Transportation U-24 Rest Stop	T. 26 S., R. 1 E., Section 29 - Spring

3.3.3.3 Groundwater

Groundwater recharge primarily originates as precipitation in the mountain areas surrounding the planning area where geologic formations outcrop or water resources were deposited during past geologic periods. Groundwater quality is highly variable and dependent on the formations where the aquifers are located. Groundwater contamination is a concern. Fresh water in the Navajo Formation is contaminated with high levels of TDS adjacent to Muddy Creek.

3.3.4 Vegetation

Vegetation communities provide the foundation for many resources and resource uses on public lands. Plant communities provide habitat for wildlife, forage for livestock, influence recreation use and are components of scenic quality. Healthy vegetation communities stabilize soils, increase infiltration of precipitation, slow runoff, reduce erosion, and enhance visual quality.

Patterns of vegetation structure and species composition are influenced by soil, climate, topography, and disturbance. Disturbances (such as fire) influence the structure and species composition of vegetation communities. Increases in the interval between fire disturbances in nearly all vegetation communities have resulted in increased vegetation density and change in vegetation structure and species composition.

The vegetation community and association descriptions that follow refer to the combination of plants forming natural vegetation in an area. These descriptions combine Utah Land Cover Geographical Analysis Program (GAP) data into three broad categories: desert shrub, sagebrush steppe, or forest and woodlands (USGS 2004). Each category contains one or more vegetation community or association, as illustrated on Map 3-3, Vegetation Cover Types. The vegetation associations are defined by the dominant plant species of either the tree or shrub vegetation layer (Jennings *et al.* 2004). The primary vegetation associations within the lands managed by the RFO are desert shrub, pinyon-juniper woodlands, sagebrush steppe, ponderosa pine, mixed-conifer, oak, mountain shrub, aspen, and non-vegetated. Table 3-5 lists the acreage and percentage of each vegetation association in the RFO.

Table 3-5. Vegetation Communities and Associations

Vegetation Community and Association	Richfield Field Office	
	Acres	Percent
Desert shrub	1,051,000	49%
Pinyon-juniper woodlands	552,000	26%
Sagebrush steppe	337,000	16%
Ponderosa pine	43,000	2%
Mixed-conifer	29,000	1%
Oak	20,000	1%
Mountain shrub	16,000	1%
Aspen	12,000	<1%
Nonvegetated	67,000	3%
Total	2,127,000	100%

Source: USGS 2004

3.3.4.1 Desert Shrub

Desert shrub includes the salt shrubs: shadscale, greasewood, blackbrush, and desert grassland vegetation cover types (see Table 3-6). Desert shrub vegetation comprises nearly half of the RFO (1,051,000 acres),

including much of the lower-elevation public land mostly east of Capitol Reef National Park. This is the largest vegetation community in the RFO. Located primarily on the valley floors, this vegetation community is most common on well-drained, sandy to rocky soils. However it can tolerate saline and alkaline soils. Plants within this community are adapted to a wide temperature range, and many are capable of photosynthesis at temperatures as low as 11°F (Simonin 2001). Precipitation in these areas ranges from 6 to 14 inches annually but is mostly from 8 to 12 inches per year. Table 3-6 lists species prevalent in this vegetation community.

Wildlife and livestock use of desert shrub vegetation varies depending on the species present. Fourwing saltbush is very palatable and provides high-quality forage for wildlife and livestock even during drought conditions (Kindschy 1996). Black greasewood is a valuable browse for livestock and wildlife, particularly during fall and winter; however, when consumed in large quantities, the soluble oxalates that black greasewood contains are poisonous to livestock (Anderson 2004). The forage value for blackbrush is principally as browse for bighorn sheep. Domestic sheep and goats, and to a lesser extent cattle, also browse blackbrush. During the winter in southwestern Utah, blackbrush provides fair forage for domestic sheep and cattle (Anderson 2001). Desert shrub areas provide browse and shelter for small mammals, and fourwing saltbush provides a source of water for black-tailed jackrabbits.

Table 3-6. Typical Desert Shrub Plant Species

Life form	Common Name	Scientific Name
Shrubs	Shadscale	<i>Artiplex confertifolia</i>
	Winterfat	<i>Krascheninnikovia lanata</i>
	Saltcedar	<i>Tamarix chinensis</i>
	Rabbitbrush Species	<i>Chrysothamnus spp.</i>
	Hopsage	<i>Grayia spinosa</i>
	Mormon Tea	<i>Ephedra spp.</i>
	Blackbrush	<i>Coleogyne ramosissima</i>
	Black Greasewood	<i>Sarcobatus vermiculatus</i>
	Fourwing Saltbush	<i>Artiplex canescens</i>
Grasses	Indian Ricegrass	<i>Achnatherum hymenoides</i>
	Galleta	<i>Hilaria jamesii</i>
	Alkali Sacaton	<i>Sporobolus airoides</i>
	Saltgrass	<i>Distichlis spicata</i>
	Purple Threeawn	<i>Aristida purpurea</i>
	Blue Grama	<i>Bouteloua gracilis</i>
	Sand Dropseed	<i>Sporobolus cryptandrus</i>
	Cheatgrass	<i>Bromus tectorum</i>
Forbs	Broom Groundsel	<i>Senecio spartioides</i>
	Hairy Daisy	<i>Erigeron incertus</i>
	Longleaf Phlox	<i>Phlox longifolia</i> ,
	Scarlet Globemallow	<i>Sphaeralcea coccinea</i>
	Buckhorn Cholla	<i>Opuntia acanthocarpa</i>

Source: USFS 2004 and Welsh *et al.* 1993.

3.3.4.2 Sagebrush Steppe

Widely distributed in the Colorado River Basin and Great Basin, the sagebrush-steppe vegetation community is primarily found in the western portion of the RFO. Sixteen percent (337,000 acres) of the RFO is considered sagebrush steppe. Sagebrush steppe communities generally occur on the drier portions of pinyon-juniper woodlands and mesic portions of the desert shrub community. Precipitation in these areas averages 8–15 inches per year, and soils are dry, with a thin organic horizon. Forbs with shallow root systems are favored in wetter years, whereas deeply rooted shrubs have the competitive advantage during droughts and survive by tapping deeply infiltrated moisture (West 2000). Sagebrush species

include big sagebrush, Wyoming big sagebrush, and basin sagebrush. Table 3-7 lists species in the sagebrush steppe vegetation community. Sagebrush steppe communities in Utah have declined because of drought, changes in disturbance regimes, and the invasion of cheatgrass and other invasive plant species. A recent sagebrush die-off in Utah affected approximately 600,000 acres of sagebrush habitat below 7,000 feet, primarily on public lands. The die-off is thought to be caused by stress on the plants due to an extended drought. In addition, most of the sagebrush in the RFO are mature plants, with little new growth being found.

About 100 bird species and 70 mammal species are found in sagebrush steppe communities. These species can be grouped into sagebrush obligates (e.g., sage grouse, sage thrasher, sage sparrow, Brewer's sparrow, pygmy rabbit, sagebrush vole, sagebrush lizard, and pronghorn); shrubland species (e.g., green-tailed towhee, black-throated sparrow, and lark sparrow); and shrubland-grassland species (e.g., Swainson's hawk, ferruginous hawk, prairie falcon, sharp-tailed grouse, and loggerhead shrike).

Table 3-7. Typical Sagebrush Steppe Plant Species

Life form	Common Name	Scientific Name
Shrubs	Rabbitbrush species	<i>Chrysothamnus spp.</i>
	Broom Snakeweed	<i>Gutierrezia sarothrae</i>
	Shadscale	<i>Artilex confertifolia</i>
	Antelope Bitterbrush	<i>Purshia tridentata</i>
	Fringed Sagebrush	<i>Artemisia frigida</i>
	Wyoming Sagebrush	<i>Artemisia tridentata wyomingensis</i>
	Basin Big Sagebrush	<i>Artemisia tridentata vaseyana</i>
	Fourwing Saltbush	<i>Artilex canescens</i>
Grass	Indian Ricegrass	<i>Achnatherum hymenoides</i>
	Bluebunch Wheatgrass	<i>Pseudoroegneria spicata</i>
	Crested Wheatgrass (non-native)	<i>Agropyron cristatum</i>
	Desert Needlegrass	<i>Achnatherum speciosum</i>
	Basin Wildrye	<i>Leymus cinereus</i>
	Poa species	<i>Poa spp.</i>
	Salina Wildrye	<i>Leymus salinus</i>
	Slender Wheatgrass	<i>Elymus trachycaulus</i>
Forbs	Cheatgrass	<i>Bromus tectorum</i>
	Yarrow	<i>Achillea millefolium</i>
	Arrowleaf Balsamroot	<i>Balsamorhiza sagittata</i>
	Scarlet Globemallow	<i>Sphaeralcea coccinea</i>
	Desert Phlox	<i>Phlox tenuifolia</i>
	Pricklypear Cactus	<i>Opuntia spp.</i>
Mosses and Lichens	Fleabane species	<i>Erigeron spp.</i>
	Awnless Spikemoss	<i>Selaginella mutica</i>

Source: USFS 2004 and Welsh *et al.* 1993.

3.3.4.3 Forests and Woodlands

Forest and woodland vegetation is generally restricted to areas where soil moisture is adequate to establish seedlings or where there has been a change in the disturbance regime. Adequate soil moisture is usually found at higher elevations and in riparian areas. Areas above 7,000 feet are usually dominated by forest species. Lower elevations with adequate soil moisture are dominated by pinyon-juniper woodlands. Typical forest and woodland types found within the RFO are ponderosa pine (*Pinus ponderosa*), aspen (*Populus spp.*), mixed-conifer, and pinyon-juniper woodlands. Forested areas above 10,000 feet elevation are usually a mix of several conifer species. At the lower elevations, forest types vary from pure juniper to a mix of woodland species and ponderosa pine. Table 3-8 lists species commonly found in forest and woodland areas.

Table 3-8. Typical Forest and Woodland Species

Life form	Common Name	Scientific Name
Trees	Utah Juniper	<i>Juniperus osteosperma</i>
	Rocky Mountain Juniper	<i>Juniperus scopulorum</i>
	Pinyon Pine	<i>Pinus edulis</i>
	Singleleaf Pinyon	<i>Pinus monophylla</i>
	Ponderosa Pine	<i>Pinus ponderosa</i>
	Bristlecone Pine	<i>Pinus longaeva</i>
	Engelmann Spruce	<i>Picea engelmannii</i>
	Subalpine Fir	<i>Abies lasiocarpa</i>
	White Fir	<i>Abies concolor</i>
	Douglas Fir	<i>Psuedotsuga menziesii</i>
	Aspen	<i>Populus tremuloides</i>
	Curleaf Mountain-Mahogany	<i>Cercocarpus ledifolius</i>
Shrubs	Greenleaf Manzanita	<i>Arctostaphylos patula</i>
	Black Sagebrush	<i>Artemisia nova</i>
	Gambel Oak	<i>Quercus gambelii</i>
	Mountain Snowberry	<i>Symphoricarpus oreophilus</i>
	Serviceberry species	<i>Amelanchier spp.</i>
	Chokecherry	<i>Prunus virginiana</i>
	Oregon Grape	<i>Berberis repens</i>
	Wood's Rose	<i>Rosa woodsii</i>
	Myrtle Pachistima	<i>Pachistima myrsinites</i>
	Redberry Elder	<i>Sambucus racemosa</i>
	Gooseberry species	<i>Ribes spp.</i>
	Mountain Muhly	<i>Muhlenbergia montana</i>
Grasses	Idaho Fescue	<i>Festuca idahoensis</i>
	Sheep Fescue	<i>Festuca ovina</i>
	Mutton Grass	<i>Poa fendleriana</i>
	Blue Grama	<i>Bouteloua gracilis</i>
Forbs	Littleleaf Pussytoes	<i>Antennaria parviflora</i>
	Heartleaf Arnica	<i>Arnica cordifolia</i>
	Indian Paintbrush species	<i>Castilleja spp.</i>
	Lupine species	<i>Lupinus spp.</i>

Source: USFS 2004 and Welsh *et al.* 1993.

3.3.4.3.1 Pinyon-juniper

Pinyon-juniper woodlands occupy the driest woodland sites in Utah and provide important resources for people, wildlife, and plants. Pinyon-juniper woodland communities cover 552,000 acres, about one-quarter of the RFO. Pinyon-juniper stands grow on foothills, low mountains, mesas, and plateaus ranging from 3,000 to 8,000 feet in elevation, depending on precipitation and soil conditions. The upper limits of the pinyon-juniper woodland community in Utah are 6,500 feet on north-facing slopes and 8,400 feet on south-facing slopes. Plant species present in these areas vary widely (Evans 1988). Typically, juniper dominates at lower elevations and pinyon dominates at higher elevations (Anderson 2002, Zlatnik 1999). Pinyon-juniper woodlands provide little forage for livestock and big game.

Pinyon-juniper woodlands are increasing in the western United States as they replace other vegetation communities. Juniper is expanding into open meadows, grasslands, sagebrush steppe communities, quaking aspen groves, riparian communities, and forest lands. Increases in canopy cover results in significant amounts of bare ground, litter, and desert pavement at the soil surface (USGS 2004). On lower edges of the woodland zone, Utah juniper is frequently the only tree species. Utah juniper is more adapted to dry conditions than pinyon, with junipers often serving as nurse trees for pinyons in well developed forests. The undergrowth is variable and dependent upon canopy closure, soil texture,

elevation and aspect (Welsh et. al. 1993). In healthy pinyon and juniper communities height ranges from 15 to 30 feet. Health and relative density of pinyon and juniper vary widely within the RFO; however, canopy densities over 50% occur over large areas. Pinyon pine and Utah juniper vigorously compete with other plants for available soil water. They crowd out grasses and shrubs that usually are present as understory vegetation. The lack of protective vegetative cover in pinyon and juniper stands leaves the soil surface particularly susceptible to erosion.

The replacement of shrub steppe communities with juniper woodland is attributed to the reduced role of fire caused by the reduction of the fine fuels through livestock grazing (Miller and Rose 1995). This expansion of pinyon-juniper woodlands has been facilitated by a combination of climatic changes, fire suppression, and the removal of understory vegetation.

3.3.4.3.2 Ponderosa Pine

Ponderosa pine forest types within the RFO (Map 3-3) are found primarily in the Henry Mountains and bordering U.S. Forest Service (USFS) lands in the western portion of the RFO. Ponderosa pine can be either a climax or a seral species. It is a climax species at the lower limits of the coniferous forests and a seral species in higher-elevation mixed-conifer forests. Ponderosa pine is considered shade-intolerant and tends to grow in even-aged stands; however, in the drier limits of its range, such as the Henry Mountains, uneven-aged stands appear common. In reality, these apparently uneven-aged ponderosa pine stands are a mosaic of small even-aged groups. Ponderosa pines lose vigor in dense stands (Burns and Honkala 1990).

Fires have had a profound effect on the distribution of ponderosa pine. Although the seedlings are readily killed by fire, larger trees possess thick bark that offers effective protection from fire damage. Competing tree species, such as Douglas fir, are considerably less fire tolerant, especially in the sapling and pole size classes. Because of successful fire control during the past 50 years, many of these stands have developed under stories of Douglas fir and true firs. Type conversion has been accelerated by harvest of the ponderosa pine, leaving residual stands composed of true fir, Douglas fir, or lodgepole pine (Burns and Honkala 1990).

3.3.4.3.3 Quaking Aspen

Quaking aspen is found on relatively moist sites between 7,500 and 10,500 feet in mountainous areas within the planning area. They also occur at lower elevations in riparian communities and at other sites with deep soil and adequate soil moisture. In very high exposed places, aspen becomes stunted, with the stem bent or almost prostrate from snow and wind. At its lower limit, it is a scrubby tree growing along creeks (Burns and Honkala 1990). Aspen trees grow together in clones or in groups of stems that share the same root system and genetic makeup. Quaking aspen seedlings at one year of age are capable of reproducing by root sprouts (suckers), and mature stands reproduce vigorously by this means. Root collar sprouts and stump sprouts are produced only occasionally by mature trees, but saplings commonly produce them (Burns and Honkala 1990). Aspen clones may regenerate readily after clearcutting or burning by producing numerous root sprouts. Root damage during logging can reduce sprouting. Clearcutting a mixed aspen-conifer stand may lead to replacement with pure aspen stands, depending on location. This forest type is very important for landscape diversity, aesthetics, and wildlife habitat.

The fast-growing quaking aspen tree is short-lived, and pure stands are gradually replaced by slower-growing species. Areas once dominated by aspen in the state of Utah show a 60% decrease since the late 1800s (Shepperd *et al.* 2001). The diversity and abundance of understory plants in an aspen stand can be 10 times that found in coniferous forest types. In addition, aspen forests yield more water than conifer types in similar environments.

3.3.4.3.4 Mixed Conifer

Mixed-conifer forest types within the planning area occur at the highest elevations, usually above 10,000 feet. The mixed-conifer forest type is generally found at higher elevations and includes Douglas fir, white fir, subalpine fir and Englemann spruce. Mixed-conifer forests can be very complex in structure and age distribution. Their species are shade-tolerant and generally not considered resistant to fire. Fires are infrequent but important in dry years, and windthrow is an important disturbance factor.

3.3.4.4 Riparian Resources

The BLM's 1987 policy statement on riparian area management defines a riparian area as "an area of land that is directly influenced by permanent water. It has visible vegetation or physical characteristics reflective of permanent water influence. Lake shores and stream banks are typical riparian areas. Excluded are such sites as ephemeral streams or washes that do not exhibit the presence of vegetation dependent upon free water in the soil." A riparian area identified as lentic is usually considered to be a meadow/spring riparian area while a riparian area identified as lotic would have running water such as a creek or river.

Riparian areas cover less than 1% of the planning area. The most extensive areas of riparian vegetation on public land are those found along the Dirty Devil River and the Fremont River east of Capitol Reef National Park. The ecological significance of riparian areas far exceeds their limited physical area. They are located along streams and rivers or lands with a water table that is capable of influencing soils and vegetation. They are major contributors to ecosystem productivity and structural and biological diversity, and they provide important habitat for fish, birds, and other wildlife species. Riparian areas affect the quantity and quality of water onsite and downstream, and help store floodwaters, recharge groundwater, reduce the risk of flash floods, and filter sediments.

It is the objective of the Utah BLM Riparian Policy to improve or maintain riparian areas in proper functioning condition (PFC). Regardless of the type of riparian or wetland ecosystem, functioning condition is assessed for each stream or varying segments. Functioning condition is rated by category to reflect ecosystem health as affected by management practices. Riparian areas are classified as in PFC when there is adequate vegetation and landform structure present to dissipate stream energy from high flows. This results in a reduction in erosion, improvement in water quality, filtration of sediment, capturing of bedload, and an aid in floodplain development. Properly functioning riparian areas also result in an improvement in flood water retention and ground water recharge, the development of root masses that stabilize stream banks against cutting action, the development of diverse ponding and channel characteristics necessary for fish production and other uses, and support greater biodiversity.

"Functioning at Risk" riparian areas are in functional condition, but at least one soil, water, or vegetation attribute makes them susceptible to degradation following high flow events. Management practices that can make them "At Risk" include livestock grazing, the presence of roads, off-highway vehicle (OHV) activities, and commercial recreation and development.

"Non-Functioning" riparian areas are clearly not providing adequate vegetation, landform, or large wood debris to dissipate stream energy associated with high flows, and thus are not reducing erosion, improving water quality, etc.

BLM has inventoried riparian areas throughout the RFO. About 400 miles of lotic riparian habitat and 1,180 acres of lentic riparian habitat have been inventoried on public lands in the RFO. Estimates of functional conditions of these riparian areas are displayed in Table 3-9. It should be noted that this does not represent a comprehensive total of all riparian habitats within the RFO, because not all have been

surveyed. Utah's Standards for Rangeland Health (BLM 1997) establish proper functioning condition as the minimum standard for BLM management of riparian areas.

Table 3-9. Riparian Conditions Inventory

		Proper Functioning Condition	Functioning at Risk	Non- functioning	Total
Lotic Riparian	miles	262 mi	90 mi	47 mi	399 mi
	% surveyed	66%	22%	12%	100%
Lentic Riparian	Acres	1053 ac	103 ac	23 ac	1,179 ac
	% surveyed	89%	9%	2%	100%

*Source: Riparian Inventories, Richfield Field Office, 2003

Riparian areas are dynamic and, compared to upland habitats, extremely responsive to changes. Variations in seasonal water flows influence the productivity and density of riparian vegetation and channel development. Flooding is an essential part of system development and stability. Minor changes are normal and are part of the resilience of the riparian ecosystem. A system's ability to withstand major disturbances is dependent on the integrity and balance of stream bank, hydrology, and vegetation components. Degraded conditions in any of those components can result in impacts that may be beyond the riparian area's capacity to withstand or repair following disturbance. The combined effects of small-scale, repeated degradation without recovery cause incremental declines in functional condition and increase vulnerability to further degradation. It is BLM policy to maintain, restore or improve riparian ecosystems to achieve a healthy and proper functioning condition that ensures biological diversity, productivity, and sustainability.

Riparian areas are dependent on a balanced combination of physical (stream bank, channel, soil characteristics), hydrologic (regular occurrence of surface water), and vegetation (hydrophytic communities) components. When any of these three components—soils, water, and vegetation—are adversely affected, the functional capacity of a riparian habitat may be degraded. Riparian-wetland areas are properly functioning when adequate vegetation, landform, or large woody debris is present to dissipate stream energy associated with high water flows and flooding, thereby reducing erosion and improving water quality. Deep soil-binding root masses stabilize stream banks against erosion.

3.3.4.5 Invasive, Nonnative Species

The BLM defines a weed as "a plant that interferes with management objectives for a given area of land at a given point in time" (BLM 2007). Noxious weeds are designated by Federal or state law as generally possessing one or more of the following characteristics: aggressive and difficult to manage; parasitic; a carrier or host of serious insects or disease; or non-native, new or not common to the U.S. Noxious weeds are defined in Utah's *Standards for Rangeland Health and Guidelines for Livestock Grazing* (BLM 1997) as non-native plants that are especially undesirable because they have no forage value and are sometimes toxic, or are capable of invading plant communities and displacing native species. The BLM recognizes noxious weed invasions as one of the greatest threats to the health of rangelands nationwide.

Invasive species include plants able to establish on a site where they were not present in the original plant composition. Invasive species aggressively out-compete native species within a community and often alter the physical and biotic components enough to affect the entire ecological community. Invasive species are of particular concern following a disturbance. They are often exotic species that do not have naturally-occurring, local predators.

The Utah Noxious Weed Act defines a noxious weed as any plant that is determined by the Commissioner of Agriculture to be especially injurious to public health, crops, livestock, land, or other property. Nineteen species have been designated as state noxious weeds, and 15 have been additionally classified as new and invading weeds that have the potential to become noxious weeds. The state noxious weed list is presented in Table 3-10.

Table 3-10. Utah Noxious Weeds

Common Name	Scientific Name
Bermudagrass	<i>Cynodon dactylon</i>
Bindweed (Wild Morning Glory) *	<i>Convolvulus arvensis</i>
Canada Thistle *	<i>Cirsium arvense</i>
Diffuse Knapweed *	<i>Centaurea diffusa</i>
Dyers Woad	<i>Isatis tinctoria</i>
Perennial Sorghum species including Johnsongrass (Perennial sorghum) *	<i>Sorghum alnum</i> <i>Sorghum halepense</i>
Leafy Spurge	<i>Euphorbia esula</i>
Medusahead	<i>Taeniatherum caput-medusae</i>
Musk Thistle *	<i>Carduus nutans</i>
Perennial Peppergrass *	<i>Lepidium latifolium</i>
Purple Loosestrife	<i>Lythrum salicaria</i>
Quackgrass *	<i>Agropyron repens</i>
Russian Knapweed *	<i>Centaurea repens</i>
Scotch Thistle *	<i>Onopordum acanthium</i>
Spotted Knapweed	<i>Centaurea maculosa</i>
Squarrose Knapweed *	<i>Centaurea squarrosa</i>
Whitetop *	<i>Cardaria draba</i>
Yellow Star Thistle	<i>Centaurea solstitialis</i>

Note: Species marked with an asterisk (*) occur within the RFO. The remaining species have been identified on adjacent private, State, or USFS lands.

Source: Utah Department of Agriculture and Food 2003b.

In addition to the list generated by the State of Utah, each county weed control board has the authority to develop its own list. Table 3-11 lists weeds designated as noxious in any of the five counties within the planning area.

Table 3-11. County Noxious Weeds 2003

Common Name	Scientific Name	County Listed
Black Henbane	<i>Hyoscyamus niger</i>	Sanpete
Houndstongue	<i>Cynoglossum officinale</i>	Sanpete
Velvet Leaf	<i>Abutilon theophrasti</i>	Sanpete
Russian Olive	<i>Elaeagnus angustifolia</i>	Sevier, Wayne

Source: Utah Department of Agriculture and Food 2003b.

Utah BLM has designated several other invasive plants as new and invading weeds. These plants, although not listed by the state or any of the five counties, are identified based on their potential to invade and possibly alter plant communities in the RFO. Table 3-12 identifies these species.

Table 3-12. Utah BLM New and Invading Weeds

Common Name	Scientific Name
Black Henbane	<i>Hyoscyamus niger</i>
Camel Thorn	<i>Alhagi camelorum</i>
Dalmatian Toadflax	<i>Linaria dalmatica</i>
Goatsrue	<i>Galega officinalis</i>
Jointed Goatgrass	<i>Aegilops cylindrica</i>
Poison Hemlock	<i>Conium maculatum</i>
Purple Starthistle	<i>Centaurea calcitrapa</i>
Silverleaf Nightshade	<i>Solanum elaeagnifolium</i>
St. John's Wort	<i>Hypericum perforatum</i>
Velvetleaf	<i>Abutilon theophrasti</i>
Water Hemlock	<i>Cicuta douglasii</i> (<i>C. maculata</i>)
Wild Proso Millet	<i>Panicum miliaceum</i>
Yellow Nutsedge	<i>Cyperus esculentus</i>
Yellow Toadflax	<i>Linaria vulgaris</i>

Source: BLM 2004b.

Finally, the RFO has identified four invasive species in addition to the state, county, and Utah BLM plants. These additional species, which are known to cause problems within the local plant communities in the RFO, are:

- Puncture vine, which is also known as Goat's head (*Tribulus terrestris*)
- Salt cedar, which is commonly referred to as tamarisk (*Tamarix chinensis* or *T. ramosissima*)
- Small flowered tamarisk (*Tamarix parviflora*)
- Buffalobur (*Solanum rostratum*).

Russian knapweed (*Centarea repens*), salt-cedar (*Tamarix chinensis*), and Russian olive (*Elaeagnus angustifolia*) are all problematic species occurring in riparian areas of the RFO. Salt-cedar channelizes rivers with its deep roots and chokes out other vegetation.

Changes to the above lists occur as new plant species become problems. It should be noted that a species' absence from the lists does not mean that the species is not considered in management decisions. For example, although large areas of uplands and rangelands are being converted to invasive annual species including cheatgrass (*Bromus tectorum*) and Russian thistle (*Salsola tragus*), neither species is included in any of the above lists. Once cheatgrass has established on a site and gone through a couple of cycles of seed production and dispersal, the seed bank can contain two or three times as many viable cheatgrass seeds as there are established plants in the community (Zouhar 2003). Cheatgrass invasion may be accelerated by disturbance, but disturbance is not required for its establishment. Cheatgrass can also thrive in areas that have little or no history of cultivation or grazing by domestic livestock. It may establish in these relatively undisturbed areas when seed disperses from nearby patches and establishes on sites of small natural disturbances, such as where rodents or predators dig in the soil (Zouhar 2003). It has changed plant species composition in all three vegetation communities.

3.3.5 Cultural Resources

Overviews of known cultural resources in the RFO show a wide range of and potential for cultural resources. Cultural resource inventories have been conducted in the lands managed by the RFO for more

than 30 years at varying levels using a variety of methods. Most of the inventories were conducted in accordance with Section 106 of the National Historic Preservation Act (NHPA) as part of impact mitigation from surface disturbing activities, although academic institutions have performed some research excavations. Inventories have identified several thousand cultural properties throughout the RFO, representing a wide variety of site types and chronological periods. Overall, less than 5% of the RFO has been inventoried.

Compared with other areas in the Southwest, site densities in inventoried areas are low throughout the RFO. Site densities increase near Capitol Reef National Park and in some of the canyons in eastern Wayne and Garfield counties. Site densities are much lower in Sevier County, with the lowest densities being found in Sanpete and Piute counties. Known cultural resources include various site types, ranging from about 10,000 years ago through the present. The site types are listed and described below.

3.3.5.1 Site Types

Cultural resources in the RFO have been classified according to one or more site types. Site types are groupings of sites with similar physical or cultural characteristics. Complete information may not be readily available during original recordation to determine the functional or cultural site type. Consequently some sites may be recategorized after further research. Sites fitting into more than one category are usually more complex and have more information potential than do single-category sites. At the broadest level, cultural resources sites are categorized as either prehistoric or historic types.

3.3.5.1.1 Prehistoric Site Types

Prehistoric sites can be associated with one or more of four broad thematic periods: Paleo-Indian, Archaic, Formative (Fremont or Anasazi), and Protohistoric. There are sites within the RFO from each period, with an especially large representation of Formative sites. Some of the site types in the RFO include the following:

- **Rock Art.** Rock art can be of two types, petroglyphs and pictographs. Petroglyphs are designs pecked or incised into the surface of the rock; pictographs are painted on the rock surface with various shades of pigment. At some sites, designs have been pecked into the surface and then painted. Rock art has not been attributed to specific human groups with any degree of assurance, but it is believed that rock art within the RFO represents groups living from before 9000 B.C. to the present.
- **Rockshelter.** A rockshelter consists of a rock outcrop or large boulder that provides shelter from wind, sun, rain, and other elements. Rockshelters were used both prehistorically and historically.
- **Lithic Scatter.** A lithic scatter is any group of stone artifacts or artifact fragments. Lithic scatters are usually composed of flaked stone tools or debitage. Ground stone tools and tool fragments also fit into this category. This type ranges from sites with only a single tool present to sites with thousands of artifacts, diverse in type and function.
- **Ceramic Scatter.** A ceramic scatter is any group of ceramic artifacts or artifact fragments and can result from either prehistoric or historic activity. Most prehistoric ceramics represent the Fremont Indian culture or tradeware from the Anasazi culture to the south, but a small amount of Numic (e.g., Ute or Paiute) pottery has been recorded.
- **Cairn.** A cairn is an intentionally created pile of stones. Most cairns in the RFO are from the historic period (e.g., sheepherders' monuments, mining claim markers, etc.). However, some may be prehistoric.
- **Hearth.** A hearth is the remains of a feature where humans purposely used fire. This includes clay- or rock-lined fire pits, ash pits, ash stains, and fire-cracked rock concentrations or scatters.

- **Rock Alignment.** A rock alignment is any human arrangement of rock not usually recognized as part of a structure.
- **Cist.** Cists are small structures usually built for storage. They are slab lined or coursed masonry, generally about one meter in diameter. They are usually semi-subterranean but can occur on the surface, freestanding or attached to a cliff face or ledge.
- **Burial.** Burial sites are those that contain human physical remains below the surface or exposed, whether marked or not.
- **Structural.** These sites are constructed from a wide range of material types and include various features within the structure. They consist of structures of brush and trees, mud and sticks, coursed masonry, and slab-lined, boulder-lined, or unlined pits occurring in open or naturally protected areas.
- **Midden.** Middens are concentrations of all or several of the following: ash, charcoal, bone, sherds, lithic fragments, human excrement, and general garbage.

3.3.5.1.2 Historic Site Types

Historic sites are cultural resources with a period of significance between 1700 A.D. to the present. Because features such as ditches, fences, and houses cannot be understood or interpreted outside the functional complex of which they are a part, historic resources are grouped into several themes. Some of these themes are organized chronologically, although most are functionally organized.

- **Anglo Exploration:** The pre-settlement category includes historic features from the period before the settlement of the five counties in the planning area. Limited features of this period have been identified. There are several records of individuals and groups passing through this area along what became known as the Old Spanish Trail. Remains of their activities may possibly be found. The Old Spanish Trail was designated a National Historic Trail in late 2002.
- **Ranching:** The ranching category includes features resulting from the raising of domestic livestock, such as fences, water developments, cabins, corrals, camps, and sheepherders' monuments. There is a long history of ranching in the RFO, and the features remaining from these developments are useful historic resources.
- **Farming:** The farming category includes features resulting from raising crops; digging or drilling wells; building barns, sheds, and cisterns; using farm implements; and constructing canals, ditches, and residences.
- **Mining:** The mining category includes features resulting from exploration and extraction of mineral resources, such as shafts and adits, drill sites, prospect holes, tailing dumps and waste rock piles, ore bins, loading chutes, kilns, tramways, residences, and other buildings.
- **Transportation:** The transportation category includes features resulting from attempts to transport people or goods across the RFO, such as abandoned rail lines, railroad grades, construction camps, bridges, roads, trails, and possible remains of river navigation.
- **Government Management:** The governmental management category includes features resulting from government attempts to manage the land and its resources. Many of these features are the result of Civilian Conservation Corps (CCC) activities through the 1930s. They include dams, fences, land treatments or manipulations, spring developments, roads, and bridges.

3.3.5.2 National Register of Historic Places

Three sites within the lands managed by the RFO have been formally listed on the National Register of Historic Places (NRHP). They are:

- **Cowboy Caves.** This site consists of two adjacent caves: Cowboy Cave and Walters Cave. Together they make up one of the richest archaic sites on the Colorado Plateau and outline almost 5,000 years of intermittent human habitation in the area.
- **Bull Creek Archaeological District.** This area of roughly 1,900 acres contains 104 identified significant archaeological sites, including habitations, storage structures, camps, and quarries. These sites represent a 400-year occupation (A.D. 800–A.D. 1200) of the area by peoples from the Formative period.
- **Starr Ranch.** The stone cabin here is a remnant of a 1890s stock-raising boom, when large cattle herds were introduced in the Henry Mountains. Starr Ranch is situated on the south slopes of Mt. Hillers, and its stone buildings are still standing.

Many other sites throughout the RFO meet the eligibility criteria for National Register listing. Current laws protect sites that are listed on the National Register and those that are eligible for such a listing.

3.3.5.3 Cultural History Overview

Cultural resources in the RFO are categorized into two major time periods separated by the presence of European influence in the region. Prehistoric sites can be associated with one or more of four broad cultural periods that are distinguished based on differences in material culture traits or artifacts and subsistence patterns. Prehistoric sites can be associated with one or more of four broad thematic periods: Paleo-Indian (before 5500 B.C.), Archaic (5500 B.C. to 700 A.D.), Formative (700 A.D. to 1300 A.D.), and Protohistoric (1300 A.D. to ca. 1776 A.D.).

3.3.5.3.1 Paleo-Indian (Before 5500 B.C.)

There is no firm date for the earliest human use of the lands managed by the RFO; however there is evidence of human use about 12,000 years ago. Chronologically, Paleo-Indians were contemporaries with extinct megafauna, and evidence outside the planning area shows the early human dependency on these animals (Spangler 2001). No sites that can definitely be assigned to this period have been found in the planning area, although many Paleo-Indian projectile points have been found throughout the Henry Mountains. Based on the period artifacts found throughout the area, it is safe to assume that Paleo-Indians did make use of the Henry Mountains; therefore, a potential for future discovery remains. Because of the rare nature of these resources, any discovery of Paleo-Indian sites would be significant.

3.3.5.3.2 Archaic (5500 B.C. to A.D. 700)

The Archaic tradition may be defined as a generalized hunter-gatherer adaptive strategy, with peoples employing “common adaptive strategies to exploit a variety of desert environments” (Spangler 2001). The warmer, dryer environment following the Paleo-Indian period resulted in a change from the big-game subsistence pattern of the Paleo-Indian to a small game hunting, seed, and nut-gathering subsistence pattern. It is thought that Archaic peoples “followed an annual round in response to changing resource availability, living in small, kin-related groups throughout most of the year” (Tipps 1988). These highly adaptive groups could easily move from where resources were depleted to where resources were abundant, roving from location to location, with their diet focusing on a new staple food source at each different location. Toward the end of the Archaic period, the hunter-gatherer tradition was gradually incorporated into supplemental agricultural subsistence. Evidence of agriculture exists in southern and southeastern Utah, dated to early Anasazi cultures around 1000 B.C. (Craig Harmon, BLM Richfield FO, Personal communication 2003). Archaic sites are common in the RFO. A few places in the area that were inhospitable to later Formative occupation seemed to favor earlier Archaic use.

Because of the small nature of the Archaic sociopolitical groups, the few seasonal cave and overhang dwellings thus far discovered are estimated to represent only a portion of the sites used. Potential for further Archaic site discoveries remains throughout the RFO.

3.3.5.3.3 Formative (A.D. 700 to A.D. 1300)

The Formative Period saw the continued growth of the Anasazi or ancestral Puebloan cultures in addition to the Fremont culture. Evidence of the Anasazi is limited to areas east of Capitol Reef National Park, and it does not extend much farther north than the Henry Mountains area. Archaeological evidence of the Fremont people is generally found north of the Puebloan areas throughout much of central and eastern Utah (Craig Harmon, BLM Richfield FO, Personal communication 2003). Archaeological evidence from north of the Henry Mountains area contains evidence of the Fremont and Puebloan cultures.

Formative cultures led a more sedentary life than did their Archaic predecessors. Consequently, Formative cultures resulted in more permanent settlements. The Formative Fremont are “archaeologically characterized by the use of ceramics and the bow and arrow, habitation of deep pithouses in small riverine settlements, and a metate with a shelf, termed the Utah metate” (Miller 2002). Much of the rock art in the RFO is attributed to Formative cultures, although rock art from Archaic and Numic cultures also has been noted. Most sites in the RFO identified as belonging to a specific cultural group are either wholly from or contain components of Formative cultures.

3.3.5.3.4 Protohistoric (A.D. 1300 to ca. 1776)

Following the seemingly abrupt decline and disappearance of the Fremont culture around A.D. 1300, archaeological evidence suggests that Numic-speaking tribes (Paiute, Shoshone, Goshute) and the Navajo entered the area (Craig Harmon, BLM Richfield FO, Personal communication 2003). According to the idea of Numic Expansion, suggested earlier in the 20th century, these cultures relied on late Archaic hunting and gathering traditions rather than the agriculturally augmented Formative subsistence patterns. However, most records and diaries kept by the early settlers in Utah contain several references to the many small farming communities that they encountered in the mid-19th century along the Virgin and Santa Clara Rivers in southwestern Utah. This seems to indicate the opposite of what the Numic Expansion idea suggests. More research remains to be conducted regarding this question.

Sites from this period are beginning to be located in the planning area. They have probably been observed many times before but were ascribed to and recorded as Fremont.

3.3.5.3.5 Historic (After ca. 1776)

The first documented Europeans in Utah arrived in 1776–1777, led by the Spanish Catholic Fathers Dominguez and Escalante. Trappers, explorers, and emigrants passing through to the Pacific coast followed them. Between the early 1830s and the late 1840s, users of what is now known as the Old Spanish Trail navigated numerous routes, many of which cross portions of the RFO (NPS 2001). European settlement of the planning area ranged from 1848 in Sanpete County to the 1880s in Wayne County (Powell 1994) and was predominantly accomplished by Mormon pioneers. These early communities focused on farming and ranching for subsistence.

A gold and silver boom in the Tushar Mountains in the 1890s and early 20th century spawned several small towns in Piute County. When the mines were no longer productive, the population boom reversed itself. Later, lead, zinc, alunite, and uranium were mined (Powell 1994). Over the years, ranching has continued as a use of public lands. Although most historic period cultural resources in the five-county

area are not located on public land, there are exceptions, such as the Wolverton Historic Mill and Starr Ranch.

3.3.5.4 Cultural Relationships

Several tribes maintain active interests in use and management of the lands managed by the RFO. Continuing consultation efforts with these groups have identified a few areas of tribal religious significance and/or traditional use within the RFO. Tribes have also expressed concerns over the preservation and protection of specific archaeological sites and impacts to prehistoric sites from disturbance.

3.3.5.5 Cultural Resource Condition and Trend

The condition and trend of cultural resources in the RFO vary considerably as a result of the diversity of terrain, geomorphology, access and visibility, and past and current land use patterns. Because recorded sites are manifested by discovery of exposed artifacts, features, and/or structures, they are easily disturbed by natural elements such as wind and water erosion, natural deterioration and decay, as well as animal and human intrusion and development and maintenance activities. Based on limited site monitoring, the trend of site conditions in the RFO is considered to be downward. Indications of active vandalism or collecting (unauthorized digging and “pothunting”) have been observed in limited instances. Archaeological and historic sites are known to be deteriorating from a variety of causes. Many sites are deteriorating from natural causes and many others from the illegal activities of artifact collectors. Inadvertent damage from construction projects also impacts resources. Collectively, these agents have adversely affected and continue to adversely affect many known cultural resources.

3.3.5.6 Consultation

Section 106 of the National Historic Preservation Act of 1966 requires the BLM and other Federal agencies to take into account the effects of their undertakings on historic properties, and afford the Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment. The historic preservation review process mandated by Section 106 is outlined in regulations issued by ACHP. The BLM first determines whether it has an undertaking which is defined in the regulations as a type of activity that could affect historic properties. Historic properties are properties that are included in the National Register of Historic Places or that meet the criteria for the National Register. If so, BLM must consult with the State Historic Preservation Office. If BLM determines that it has no undertaking, or that its undertaking is a type of activity that has no potential to affect historic properties, the agency has no further Section 106 obligations.

In most of Utah, the BLM operates under the State Protocol Agreement with the Utah State Historic Preservation Officer that defines the manner in which the BLM will meet its responsibilities under the NHPA as well as the National Programmatic Agreement among the BLM, the ACHP, and the National Conference of State Historic Preservation Officers. The Agreement established certain review thresholds under which the BLM will request the review of the Utah State Preservation Officer (SHPO) and the ACHP in certain situations. These include:

- Non-routine interstate and/or interagency projects or programs;
- Undertakings that directly and adversely affect National Historic Landmarks or National Register eligible properties of national significance;
- Highly controversial undertakings, when Council review is requested by the BLM, SHPO, an Indian Tribe, a local government, or an applicant for a BLM authorization;

- Undertakings affecting National Register eligible or listed properties;
- Land exchanges, land sales, Recreation and Public Purposes Act (R&PP) leases, and transfers;
- When BLM professional staff lack the appropriate regional experience or professional expertise, and until performance is mutually acceptable to the BLM Deputy Preservation Officer and SHPO;
- When BLM's professional cultural resources staff wishes to bring a particular project to the attention of the SHPO.

The Protocol Agreement allows the BLM to streamline the review process significantly on projects that result in no effect to historic properties. The following steps would be followed in determining that there would be “no potential to affect”: (1) identify the area of potential effect (APE); (2) conduct a Class I (literature) search and/or review other relevant records for historic properties/eligible historic properties within the APE; (3) notify the tribes or other entities that would have consulting party status of the proposed action and provide them with the opportunity to identify traditional cultural and religious properties and/or other historic and potentially eligible properties; (4) communicate/consult with tribes and other entities that would have consulting party status through letter and phone calls which, if properly documented, should demonstrate a “good faith” effort on the BLMs part; and (5) carefully and thoroughly document the BLMs findings and communications/consultation. The BLM will not request the review of the SHPO in the following situations:

- No Potential to Affect determinations by qualified BLM staff.
- No Historic Properties Affected; no sites present, determined by qualified BLM staff.
- No Historic Properties Affected; no eligible sites present, determined by qualified BLM staff.
- No Historic Properties Affected; eligible sites present, but not affected as defined by 36CFR800.4.

3.3.5.7 Native American Religious Concerns

The area encompassed by the planning area boundary has seen considerable prehistoric and historic American Indian use. Several Federally-recognized American Indian tribes identified to date either have a history of traditional use in or ancestral ties to this area (although there may be other tribes interested in the area). These tribes are:

- Paiute Indian Tribe of Utah (headquartered in Cedar City, Utah)
- Uintah and Ouray Ute (headquartered in Ft. Duchesne, Utah)
- Hopi Tribe (headquartered in Kykotsmovi, Arizona)
- Navajo Nation (headquartered in Window Rock, Arizona)
- Southern Ute Tribe (headquartered in Ignacio, Colorado)
- Ute Mountain Ute Tribe (headquartered in Towaoc, Colorado)
- Kaibab Paiute Tribe (headquartered in Pipe Springs, Arizona)
- San Juan Southern Paiute Tribe (headquartered in Tuba City, Arizona)
- Moapa Paiute Band (headquartered in Moapa, Nevada)
- White Mesa Ute Band (headquartered in White Mesa, Utah)

In addition to these tribes, the BLM also includes the Navajo Utah Commission in Montezuma Creek, Utah, and the Utah Division of Indian Affairs in Salt Lake City, Utah, in discussions related to BLM actions (including land use planning).

The BLM is the present custodian of the public land in the planning area, but this was not always the case. Innumerable American Indian groups were present in this area for thousands of years prior to Euro-American contact and occupation that began a few hundred years ago. Spiritual, emotional, and physical ties between these American Indians and their traditional homelands have existed for a long time and will no doubt continue to exist.

There are many places on Federal lands where Indians practice their religions. Many of the lawful activities that are permitted or authorized on Federal lands can compromise the integrity of sacred places and the privacy of religious practices. With this in mind, Executive Order 13007 on Indian Sacred Sites was signed “to protect and preserve Indian religious practices.” The order obligates Federal land managers to work with Indian tribes to help protect their basic rights and the practice of their religions. When planning and implementing land uses, BLM generally has the ability to accommodate tribal access to sacred sites and to prevent physical damage or intrusions that might impede their use—if the existence of the sites is known.

3.3.5.8 Tribal Interest

The Paiutes claim both traditional use of and ancestral ties to the area managed by the RFO. Their interest includes specific claims relating to important and sacred areas as well as to certain other site locations. Some of these claims have recently been documented and supported in an ethnographic study conducted by Dr. Richard Stoffle of the University of Arizona (September 2004).

The Hopi claim ancestral ties to the prehistoric groups represented here and feel that they can trace Hopi clan migrations through symbols present in area rock art. The Utes have ancestral ties to central Utah. Both the Uintah and Ouray Ute and the Hopi Tribe have been willing to enter into consultation with BLM and comment on proposals in the RFO that have the potential to affect tribal interests.

The Navajo interest in this area is confined to that part of the planning area east of Capitol Reef National Park and stems from the 1850s when Kit Carson and the U.S. Army attempted to round up the Navajos and move them from their ancestral homeland into New Mexico. During this “Long Walk” or “Big Roundup” time, many Navajo people escaped north into the Henry Mountains and remained there for some time. As a result, the Navajo Nation claims this area as a traditional cultural property, although no formal nomination as such has been made to date. The Navajo interest also extends to the Dirty Devil River corridor and the Horseshoe Canyon drainage.

Meetings to discuss the RMP have been held with all the tribes mentioned above. A more detailed discussion of consultation with American Indian tribes can be found in Chapter 5 of this Draft Resource Management Plan/Draft Environmental Impact Statement (DRMP/DEIS).

3.3.6 Paleontological Resources

Paleontological resources are integrally associated with the rock formations in which they are located. The geographic extent of the lands managed by the RFO contains approximately 40 sedimentary geologic formations at the surface, most containing paleontological resources.

Sedimentary formations are formed through depositional processes that lead to characteristic traits and varying potential for certain types of fossils. If extensive excavation of a certain formation in one geographic area results in substantial fossil resources, a potential exists that similar fossils will be found elsewhere in the formation, although such consistency is not a guarantee. A comprehensive paleontological resource inventory has not been completed within the RFO; however, a review of paleontological research on formations contained within the RFO has identified the types of fossil

resources known to be present. Table 3-13 identifies the geologic formations within the RFO, their predominant depositional environments, and the types of fossils present. The geologic map of the planning area (Map 6 of the Mineral Potential Report [BLM 2005b]) displays these formations in relation to the planning area boundaries.

Table 3-13. Geologic Formations Present in the Planning Area

Formation Age	Formation Name	West ¹	East ¹	Depositional Environment	Fossils Present
Quaternary	Surficial Alluvium and Colluvium	X	X	Several	Vertebrate
	Surficial Older Alluvium and Colluvium	X	X	Several	Vertebrate
Tertiary	Sevier River Formation	X		Fluvial, Lacustrine	Vertebrate; Invertebrate
	Volcanic Rocks, Undivided	X		Volcanic with some Fluvial	Invertebrate
	Dipping Vat Formation (not noted on map)	X		Fluvial	Plant
	Grey Gulch Formation (also Bald Knoll and Aurora)	X		Lacustrine	Invertebrate; Plant
	Claron Formation (not noted on map)	X		Fluvial/Lacustrine	Invertebrate; Plant
	Green River Formation	X		Freshwater Lacustrine and Fluvial	Vertebrate; Invertebrate; Plant
	Colton Formation (not noted on map)	X		Primarily Alluvial with Marginal Lacustrine and Deltaic Facies	Vertebrate; Invertebrate
	Flagstaff Formation	X		Lacustrine/Marine	Vertebrate; Invertebrate; Plant; Trace
Cretaceous-Tertiary	North Horn Formation	X		Lacustrine/Fluvial	Vertebrate; Invertebrate; Plant; Trace
Cretaceous	Price River Formation (Mesa Verde Group)	X		Fluvial and Floodplain	Plant
	Blackhawk Formation (Mesa Verde Group)	X		Deltaic and Interdeltaic	Trace vertebrate; Plant
	Star Point Sandstone (Mesa Verde Group)	X		Beach Sand and Intermediate Marine Shale	Plant; Trace
	Indianola Group (Sixmile Canyon Fm; Funk Valley Fm; Allen Valley Shale; Sanpete Fm)	X		Fluvial	Invertebrate
	Straight Cliffs Formation	X		Coastal Plain Interfingering with Marine	Vertebrate; Trace vertebrate; Invertebrate; Plant
	Mancos Shale (including Tununk and Wahweap Members)	X	X	Marine	Vertebrate; Trace vertebrate; Invertebrate; Trace invertebrate; Plant
	Dakota Sandstone	X	X	Beach to Marginal Marine (Deltaic)	Vertebrate; Invertebrate; Plant; Trace
	Cedar Mountain Formation		X	Fluvial	Vertebrate; Trace vertebrate; Plant
Jurassic	Morrison Formation (Brushy Basin and Salt Wash Members)	X	X	Fluvial	Vertebrate; Trace vertebrate; Invertebrate; Plant

Formation Age	Formation Name	West ¹	East ¹	Depositional Environment	Fossils Present
	Summerville Formation		X	Tidal Flat	Trace vertebrate
	Curtis Formation (not noted on map)		X	Marine	Invertebrate
	Twist Gulch Formation (not noted on map)	X		Marginal Fluvial, Nearshore	Invertebrate
	Entrada Sandstone		X	Nearshore Eolian	Trace vertebrate; Plant
	Carmel Formation		X	Shallow Marine	Trace vertebrate; Invertebrate, Plant
	Arapien Shale	X		Supratidal, Marginal Nearshore Fluvial	Invertebrate; Plant
Triassic-Jurassic	Navajo Sandstone	X	X	Eolian	Trace vertebrate; Plant
Triassic	Kayenta Formation	X	X	Fluvial	Trace vertebrate; Plant
	Wingate SS (not noted on map)	X	X	Eolian	Trace vertebrate
	Chinle Formation	X	X	Fluvial	Vertebrate; Trace vertebrate; Invertebrate; Plant (wood)
	Moenkopi Formation	X	X	Marine/Tidal Flat	Vertebrate; Trace vertebrate; Invertebrate; Trace invertebrate; Plant
Permian	Kaibab Limestone/Toroweap Formation	X	X	Marine	Invertebrate
	Cutler Group		X	Eolian, Fluvial, and Shallow Marine	Vertebrate; Invertebrate; Plant; Trace vertebrate; Trace Plant
Pennsylvanian	Hermosa Group		X	Marine	Invertebrate

Note 1: East and West refers to the eastern and western portions of the planning area, with Capitol Reef National Park acting as the dividing line between the two sides.

Sources: Condon 1997; Doelling 2004; Graffam and Bourdon 1999; M. Hayden, Utah Geological Survey, Personal communication, 2004; Hintze *et al.* 2003; Rowley *et al.* 2002; Rowley, *et. al.* 2004; Steven *et al.* 1990; Stokes 1986.

More than half of the sedimentary formations (23 of 40) in the planning area are known to contain vertebrate or trace vertebrate fossils. However, some formations have a higher potential than others to contain significant numbers of vertebrate fossils. The Morrison and Cedar Mountain formations are noted for vertebrate fossils. Several complete fossil skeletons have been scientifically excavated from several specific localities in the planning area.

In addition to the potential for containing paleontological resources, paleontological localities identify areas where the presence of fossils is known. Roughly 587 paleontological localities are in the five counties that make up the planning area. The BLM is responsible for managing about one-third of these localities.

3.3.7 Visual Resources

The planning area contains a broad range of visual settings, ranging from mountain landscapes and steep canyons, to agricultural settings, to desert. The purpose of visual resource management (VRM) is to manage the quality of the visual environment and reduce the visual impact of development activities while maintaining the viability of all resource programs. VRM involves applying methods for evaluating landscapes and determining appropriate techniques and strategies for maintaining visual quality and reducing adverse impacts.

3.3.7.1 Visual Resource Inventory

Prior to completion of the current land use plans, visual resource inventories were conducted for most of the area now encompassed by the RFO. In those inventories, each acre of land was evaluated and assigned a scenic quality rating: A, B or C, with "A" representing the most scenic lands and "C" the least scenic. Criteria for determining the ratings are included in BLM Manual H-8410-1, *Visual Resource Inventory*. The BLM relied on these existing scenic quality evaluations for the purposes of this RMP revision. Excluded in the earlier inventories was a small portion of public land in Garfield County between the Dixie National Forest and the Wayne County border. In July 2003, the BLM inventoried this area for this RMP revision.

3.3.7.2 Visual Resource Management

Implementing the BLM's VRM methodology begins with the inventory process. Landscapes are evaluated based on scenic quality, visual sensitivity, and distance zones (the distance from the existing network of travel routes). VRM class recommendations are based on the inventory process, and final class determinations are established by the RMP. The VRM Class objectives are:

Class I – Preserve the existing character of the landscape. Management activity should be very limited. Change to scenery: very low and must not attract attention.

Class II – Retain the existing character of the landscape. Management activities may be seen. Change to scenery should be low and not attract the attention of the casual observer.

Class III – Partially retain the existing character of the landscape. Management activities may be seen and may attract the attention of the casual observer, but should not dominate the view.

Class IV – Allow major modifications of the existing character of the landscape. Management activities may dominate the view and be the major focus of viewer attention.

Current VRM classes for the RFO are shown below in Table 3-14 and on Map 2-1.

Table 3-14. Visual Resource Management Classes

VRM Class	Acres (BLM-Administered Surface)
Class I	0
Class II	529,500
Class III	569,000
Class IV	1,029,500

Source: BLM Land Use Plans

It should be noted that although current land use plans for the RFO did not inventory or classify any lands as VRM Class I, the BLM's visual resource management direction for lands within wilderness study areas is guided by IM-2000-96. This memorandum requires that all WSAs be managed according to VRM Class I management objectives until such time as the Congress decides to designate the area as wilderness or release it for other uses. The RFO contains 11 WSAs (446,900 acres) that are managed as VRM Class I.

The RFO contains many areas that possess a high degree of scenic quality and a high level of visual sensitivity. In general, high scenic quality within the RFO occurs in locations where the area has varied topography, unique geology and striking vistas. Areas with high visual sensitivity are the result of a high degree of visitor interest in and public concern for a particular area's visual resources, an area's high degree of public visibility, the level of use of an area by the public, and the type of visitor use that an area receives. These visual resources are appreciated by the local population as well as by visiting public.

Visitors are attracted to the area because of its scenic qualities. The main locations within the RFO that possess outstanding scenic quality and/or high visual sensitivity include, but are not limited to:

- Class A scenery (VRM Class II);
- Eleven WSAs (VRM Class I);
- Scenery in the foreground, middle distance, and background zones of major paved recreation highways (U-12, U-24, U-95, U-276);
- Scenery in the foreground and middle distance zones of unpaved roads designated as Scenic Byways (Fishlake Scenic Byway and Bull Creek Pass Backcountry Byway);
- Scenery in the foreground and middle distance zones of unpaved roads designated as Utah Scenic Byways (Kimberly/Big John Road, Cove Mountain Road, Cathedral Valley Road; Thousand Lake Mountains Road, Gooseberry/Fremont Road, Notom Road, and Posey Lake Road);
- Areas located along the public land/urban interface such as the Red Gates in Wayne County and the low hills surrounding the communities of Glenwood and Annabella in Sevier County.

3.3.8 Special Status Species

Special status species are plants, fish, and animals that require particular management attention as a result of population or habitat concerns (Appendix 9). There are five categories—

- Federally-Listed Threatened and Endangered Species and Designated Critical Habitats
- Federally-Proposed Species and Proposed Critical Habitats
- Federal Candidate Species
- BLM Sensitive Species
- State Listed Species

Federally-listed species can have habitat designated as critical to species viability. Only the Mexican spotted owl has designated critical habitat within the planning area (Map 3-4). For those species that are listed and do not have critical habitat designated, BLM cooperates with the U.S. Fish and Wildlife Service (USFWS) to determine and manage habitats of importance. BLM is working with local working groups in developing management plans for several special status species.

USFWS has responsibility under a number of Federal laws, treaties, Executive Orders (EOs), and memoranda of agreement (MOA) for the conservation and management of many fish, wildlife, and plant species and habitat. USFWS provides recommendations for protective measures for threatened and endangered species in accordance with the Endangered Species Act (ESA), as amended. Protective measures for migratory birds are provided in accordance with the Migratory Bird Treaty Act of 1918 (MBTA) and Bald Eagle Protection Act of 1940. Wetlands are afforded protection under EOs 11990 (wetland protection) and 11988 (floodplain management) and Section 404 of the Clean Water Act. Other fish and wildlife resources are considered under the Fish and Wildlife Coordination Act.

BLM has entered into an MOA with USFWS and the United States Department of Agriculture (USDA) Forest Service to improve the efficiency and effectiveness of plan-level Section 7 consultation processes under the ESA. Through this MOA, BLM agrees to promote the conservation of candidate, proposed, and listed species and to informally and formally consult on listed and proposed species and designated and proposed critical habitat during planning to protect and improve the condition of species and their habitats to a point where their special status recognition is no longer necessary.

3.3.8.1 Species Listed Under the Endangered Species Act

Table 3-15 identifies the Federally-listed species in the planning area.

Table 3-15. Federally-listed Species

Common Name	Scientific Name	Status
Birds		
Bald Eagle	<i>Haliaeetus leucocephalus</i>	Threatened
California Condor	<i>Gymnogyps californianus</i>	Experimental
Mexican Spotted Owl	<i>Strix occidentalis</i>	Threatened
Southwestern Willow Flycatcher	<i>Empidonax traillii extimus</i>	Endangered
Mammals		
Utah Prairie Dog	<i>Cynomys parvidens</i>	Threatened
Fish		
Bonytail Chub	<i>Gila elegans</i>	Endangered
Colorado Pikeminnow	<i>Ptychocheilus lucius</i>	Endangered
Humpback Chub	<i>Gila cypha</i>	Endangered
Razorback Sucker	<i>Xyrauchen texanus</i>	Endangered
Plants		
Wright Fishhook Cactus	<i>Sclerocactus wrightiae</i>	Endangered
Barneby Reed-Mustard	<i>Schoenocrambe barnebyi</i>	Endangered
San Rafael Pediocactus	<i>Pediocactus despainii</i>	Endangered
Winkler Pincushion-Cactus	<i>Pediocactus winkleri</i>	Threatened
Last Chance Townsendia	<i>Townsendia aprica</i>	Threatened
Ute Ladies'-tresses	<i>Spiranthes diluvialis</i>	Threatened
Maguire Daisy	<i>Erigeron maguirei</i>	Threatened

Source: USFWS 2004.

3.3.8.1.1 Bald Eagle

The bald eagle, the national symbol of the United States, was first protected under the Bald Eagle Protection Act of 1940, then later listed as an endangered species in most of the lower 48 states in 1966 and again in 1973. Since the banning of DDT in 1972, the bald eagle has made a remarkable recovery throughout the United States. Its status was changed to threatened in 1995 and the bald eagle was proposed for delisting in 1999. Within Utah, the bald eagle is found throughout the state (more often seen in winter than summer). Habitat consists of communal winter roosting habitat and foraging habitat that is located within the RFO. Feeding areas, diurnal perches, and night roosts are fundamental elements of bald eagle winter range. In Utah, eagles nest in mature cottonwoods. Nesting has been documented in Wayne County (Utah Division of Wildlife Resources [UDWR] 2003). Wintering habitat exists within Sanpete, Sevier, Piute and Wayne Counties. Fish and waterfowl are the primary sources of food for bald eagles, but they will also feed on rabbits, carrion, and small rodents.

3.3.8.1.2 California Condor

The California condor was listed as endangered on March 11, 1967, and noted to occur only in California. USFWS has reintroduced California condors into northern Arizona and southern Utah and designated these birds as nonessential experimental populations under the ESA. The purpose of the reintroduction was to achieve a primary recovery goal: the establishment of a second noncaptive population, spatially disjunct from the noncaptive population in southern California.

California condors are among the largest flying birds in the world. Adults weigh as much as 22 pounds. Condors are opportunistic scavengers, feeding only on carcasses. Since European settlement of California, condor populations have steadily declined. Poisoning, shooting, egg and specimen collecting, collisions with artificial structures, and loss of habitat contributed to the decline of the species. By 1987, the last wild condor was captured and taken to the San Diego Wild Animal Park. Beginning with the first successful breeding of California condors in 1988, the population (in 1996) was 121 individuals, including 104 in the captive flock and 17 in the wild. The condor experimental reintroduction places two requirements on Federal agencies: (1) that they use their authority to conserve the condors, and (2) that they informally confer with USFWS on actions likely to jeopardize the condor (50 CFR Part 17).

Birds from northern Arizona frequently forage and roost in Utah and are likely to nest in southern Utah (UDWR 2005c). To date there are no known California condors nesting or roosting sites within the RFO. Threats to the condors include inadequate protection of suitable nesting sites, as well as foraging areas near nesting sites (UDWR 2005c).

3.3.8.1.3 Mexican Spotted Owl

The Mexican spotted owl was listed as a threatened species on March 16, 1993. The range of the Mexican spotted owl extends from the southern Rocky Mountains in Colorado and the Colorado Plateau in central and southern Utah, southward through Arizona and New Mexico. Mexican spotted owls primarily forage at night. Their diet consists of a variety of mammals, birds, reptiles, and insects, with mammals constituting the bulk of the diet throughout the owl's range. Wood rats, voles, and gophers are the primary mammal food base. Steep slopes and canyons with rocky cliffs characterize much of the owl's habitat in the planning area.

A recovery plan was completed for the Mexican spotted owl in 1995. Mexican spotted owls in the RFO are located within the Colorado Plateau Recovery Unit. Threats to Mexican spotted owls include habitat loss associated with human disturbance and past and current timber harvest activity.

Designated critical habitat was established for the Mexican spotted owl in 2001 and revised in 2004. This designated habitat contains important nesting and foraging habitat for the owl. The critical habitat designation clarified that areas within critical habitat boundaries are considered critical habitat only when they contain or have the potential to contain habitat characteristics essential to the conservation of the species. For canyon habitats, the primary constituent elements include one or more of the following attributes: (1) cooler and often more humid conditions than the surrounding area; (2) clumps or stringers of trees and/or canyon walls containing crevices, ledges, or caves; (3) a high percentage of ground litter and woody debris; and (4) riparian or woody vegetation. The primary constituent elements related to forest structure include the following: (1) a range of tree species; (2) a shade canopy created by the tree branches, covering 40% or more of the ground; and (3) large, dead trees with a trunk diameter of at least 12 inches (measured at 4.5 feet above ground surface).

3.3.8.1.4 Southwestern Willow Flycatcher

The southwestern willow flycatcher was listed as an endangered species on February 27, 1995. It breeds primarily in the southwestern United States and winters in Central America and southern Mexico. Within Utah, the southwestern willow flycatcher is found in the southern and eastern parts of the state, along riparian zones of the Colorado Plateau. Current population status and trends for the southwestern willow flycatcher are unknown in Utah, and critical habitat has not been designated in Utah. Habitat for this species exists in Wayne County (UDWR 2005a, NatureServe 2004), and there has been a sighting of the species in the Fremont Valley gateway area (Suzanne Grayson, BLM Richfield FO, Personal communication 2004). The southwestern willow flycatcher is rare in southern Utah during the summer and is found most frequently in riparian habitats, especially in areas of dense willows associated with rivers and wetlands. The major factor in the decline of the flycatcher is the alteration/loss of the riparian habitat necessary for the species (UDWR 2005a).

3.3.8.1.5 Utah Prairie Dog

The Utah prairie dog was listed as an endangered species on June 4, 1973. On May 29, 1984, the prairie dog was downlisted to threatened. Historically, the Utah prairie dog was found in southwestern and central Utah. The habitat of a prairie dog consists of continuous grassland and other vegetation on flat plains. The prairie dog is found at elevations from 5,400 feet in Iron County to 9,500 feet in Wayne County, and lives both above ground and underground. The most obvious feature of a prairie dog colony is the abundance of mounds and holes. Utah prairie dog habitat is commonly divided into three recovery areas: the West Desert, the Paunsaugunt Plateau, and the Awapa Plateau. Portions of the Awapa Plateau and Paunsaugunt recovery areas are located in the RFO.

Major threats to the Utah prairie dog include habitat loss (through development and drought), poisoning, and the plague. Prairie dogs are susceptible to several diseases. These factors lead to rapid decline and even disappearance of entire colonies.

A recovery plan was completed for the Utah prairie dog in 1991. A Utah Prairie Dog Interim Conservation Strategy was completed in 1997 (IM-UT 2002-040). A current management practice for the prairie dog is a translocation program. Translocation of prairie dogs is authorized by USFWS under authority of the ESA, as amended. It is anticipated that translocations will be a major part of the management of the Utah prairie dog in the future. No critical habitat has been designated for the Utah prairie dog.

3.3.8.1.6 Colorado River Fish

Four species of fish endemic to the Colorado River Basin are listed as endangered under the Endangered Species Act. None of these species or their designated critical habitat occurs within the public lands administered by the RFO. However, because these species and their designated critical habitat are located downstream from the RFO and because some streams that traverse the RFO are tributaries to the Colorado River Basin, they are briefly discussed here.

3.3.8.1.6.1 Bonytail Chub

The bonytail chub was listed by USFWS as an endangered species in 1980. The bonytail is found in larger channels of the Colorado River system. They are endemic to the large rivers (Colorado, Green, and San Juan) of the Colorado River Basin. In April 1994, USFWS designated 1,980 miles of critical habitat for all four Colorado River fish in portions of Colorado, Utah, New Mexico, Arizona, Nevada, and California (50 CFR Part 17). UDWR has documented populations of bonytail chub within eastern Emery, Wayne, and Garfield counties (UDWR 2005a). Bonytail prefer eddies, pools, and backwaters near swift

current in large rivers. Because the historic and occupied range of the bonytail is restricted to the mainstem of the Green River, it does not substantially extend into any tributaries, such as the Dirty Devil River, originating from the planning area (USFWS 1990a).

The historical distribution of bonytail is poorly documented, but the optimum habitat of bonytail chubs, based on former collections, appears to be the open river areas of relatively uniform depth and current velocity. Adults are found mainly in pools and eddies with silt, sand, or boulder substrates. Young occur in still water or shallow pools with silt or gravel (Bosworth 2003).

Threats of extinctions are due to habitat loss (including alterations to natural flows and changes to temperature and sediment regimes), proliferation of non-native introduced fish, and other artificial disturbances (USFWS 1994b). Goals for management and conservation of bonytail are described in *Bonytail (Gila elegans) Recovery Goals: Amendment and Supplement to the Bonytail Chub Recovery Plan* (USFWS 2002a), and incorporated in Appendix 14 of this DRMP/DEIS.

3.3.8.1.6.2 Colorado Pikeminnow

The Colorado pikeminnow (formerly known as the Colorado squawfish) is a large minnow native to the Colorado River system of the western United States and Mexico. USFWS designated this species as endangered in 1967, and the species is also included in the UDWR Sensitive Species List (2003). The species is distributed within Wayne and Garfield Counties in large mainstem rivers (Green River and Colorado River) and in the lower reaches of major tributaries. In the Green River drainage, the mainstem is occupied from the confluence with the Colorado River upstream through Dinosaur National Monument. Because the historic and occupied range of the pikeminnow is restricted to the mainstem of the Green River, it does not substantially extend into any tributaries, such as the Dirty Devil River, originating from the planning area (USFWS 1991).

Changes in sediment deposition patterns, flow, and temperature caused by dams have resulted in loss and alteration of aquatic habitats and have favored nonnative competitors and predators (Bosworth 2003). Threats of extinctions are due to habitat loss (including alterations to natural flows and changes to temperature and sediment regimes), proliferation of non-native introduced fish, and other artificial disturbances (USFWS 1994b). Recovery goals have been produced to guide management and conservation efforts and are described in *Colorado Pikeminnow (Ptychocheilus lucius) recovery goals: amendment and supplement to the Colorado Squawfish Recovery Plan* (USFWS 2002b), and are incorporated as conservation measures in Appendix 14 of this DRMP/DEIS.

3.3.8.1.6.3 Humpback Chub

The Humpback chub is a rare minnow native to the upper Colorado River system. Because of the severe declines in humpback chub numbers and distribution, the species was listed as endangered in 1967 and is also included in the UDWR Sensitive Species List (2003). USFWS designated critical habitat in April 1994, as described under *bonytail chub*, above.

Humpback chub originally thrived in the fast, deep whitewater areas of the Colorado River and its major tributaries, but flow alterations, which have changed the turbidity, volume, current speed, and temperature of the water in those rivers, have had significant adverse impacts on the species. Now humpback chub in Utah are confined to a few whitewater areas in the Colorado, Green, and White Rivers (Bosworth 2003). Because the historic and occupied range of the humpback chub is restricted to the mainstem of the Green River, it does not substantially extend into any tributaries, such as the Dirty Devil River, originating from the planning area (USFWS 1990b).

Threats of extinctions are due to habitat loss (including alterations to natural flows and changes to temperature and sediment regimes), proliferation of non-native introduced fish, and other artificial disturbances (USFWS 1994b). Recovery goals to guide management and conservation of the species are documented in *Humpback chub recovery goals: amendment and supplement to the Humpback Chub Recovery Plan* (USFWS 2002c), and incorporated as conservation measures in Appendix 14.

3.3.8.1.6.4 Razorback Sucker

The razorback sucker was listed as endangered in 1991 and is also included in the UDWR Sensitive Species List (UDWR 2003). The species is believed to have historically occupied much of the Green, Colorado, and San Juan rivers, as well as the lower portions of large tributaries such as the White and Duchesne rivers. Razorback sucker occur in water of desert and submontane elevations. Habitat used may vary seasonally and includes pools, slow runs, backwaters, and flooded off-channel habitats (Bosworth 2003). Current distribution patterns are difficult to interpret, primarily because the species is rarely encountered. USFWS designated critical habitat in April 1994, as described under *bonytail chub*. A subpopulation of approximately 100 adults was found in the 1990s occupying the middle Green River, and UDWR has noted population distribution within Wayne County (Bosworth 2003, UDWR 2005a). Because the historic and occupied range of the razorback sucker is restricted to the mainstem of the Green River, it does not substantially extend into any tributaries, such as the Dirty Devil River, originating from the planning area (USFWS 1998).

The razorback sucker mainly eats algae, zooplankton, and other aquatic invertebrates. Successful reproduction has not been documented in the last 25 years. Spawning occurs during a 6-week period in April and May when water temperatures reach 53°F–64°F.

Threats of extinctions are due to habitat loss (including alterations to natural flows and changes to temperature and sediment regimes), proliferation of non-native introduced fish, and other artificial disturbances (USFWS 1994b). The USFWS has developed recovery goals to guide management and conservation efforts (USFWS 2002d).

3.3.8.1.7 Wright Fishhook Cactus

Wright fishhook cactus is a Federally-listed endangered plant that occurs in Emery, Sevier, and Wayne counties. The species is found in soils that range from clays to sandy silts to fine sands, typically in areas with well-developed biological soil crusts (Clark and Clark 1999). Wright fishhook cactus grows in salt desert shrub and widely scattered pinyon-juniper woodlands at elevations ranging from 4,280 to 6,440 feet (Utah Native Plant Society 2004). The species and its habitat are vulnerable to disturbance from domestic livestock grazing, mineral resource development, and OHV use (USFWS 1979).

3.3.8.1.8 Barneby Reed-Mustard

Barneby reed-mustard is a Federally-listed endangered plant found only in Emery and Wayne counties. The species grows on red clay soils rich in selenium and gypsum, overlain with sandstone talus derived from the Moenkopi and Chinle geologic formations (USFWS 1994a). Barneby reed-mustard grows in sparsely vegetated sites in mixed desert shrub and pinyon-juniper woodlands, at elevations ranging from 4,788 to 6,510 feet (Clark and Clark 1999). Potential threats to the population of Barneby reed-mustard include mining, trampling by hikers, and road or recreation development (USFWS 1994a).

3.3.8.1.9 San Rafael Pediocactus

San Rafael pediocactus is a Federally-listed endangered plant that grows in Emery and Wayne counties. It is found in fine-textured soils rich in calcium derived from the Carmel Formation and the Sinbad

Member of the Moenkopi formation. The species grows on benches, hilltops, and gentle slopes in pinyon-juniper woodlands and mixed desert shrub-grassland communities, at elevations ranging from 4,756 to 6,822 feet (Utah Native Plant Society 2004; USFWS 1995c). The habitat of San Rafael pediocactus is vulnerable to surface disturbance from OHV use, trampling by humans and livestock, and mineral resource exploration and development (Clark and Clark 1999).

3.3.8.1.10 Winkler Pincushion Cactus

Winkler pincushion-cactus is a Federally-listed threatened plant that occurs in Emery and Wayne counties. The species is a small, nearly round cactus with solitary or clumped stems. The crown of the stem is at or very near ground level (Utah Rare Plant Society 2004). Winkler pincushion-cactus is found in fine-textured soils derived from the Dakota Formation and the Brushy Basin Member of the Morrison Formation (Utah Native Plant Society 2004). It occurs on benches, hilltops, and gentle slopes on barren, open sites in salt desert shrub communities, at elevations ranging from 4,888 to 6,592 feet (USFWS 1995c). The habitat of the species is vulnerable to surface disturbance from OHV use, trampling by humans and livestock, and mineral resource exploration and development (Clark and Clark 1999).

3.3.8.1.11 Last Chance Townsendia

Last Chance townsendia is a Federally-listed threatened plant that occurs in Emery, Sevier, and Wayne counties. The species is found in clay, clay-silt, or gravelly clay soils derived from the Mancos Formation. These soils are often densely covered with biological soil crusts. Last Chance townsendia grows in salt desert shrub and pinyon-juniper woodlands at elevations ranging from 5,531 to 8,396 feet (USFWS 1985). Threats to Last Chance townsendia populations include poor rangeland conditions, trampling by OHV recreation use, and mining (USFWS 1993a).

3.3.8.1.12 Ute Ladies'-Tresses

Ute ladies'-tresses was first listed as threatened on January 17, 1992. It is currently designated as threatened in the entire range. The species is known to occur in Colorado, Idaho, Montana, Nebraska, Utah, Washington, and Wyoming (USFWS 1992). Ute ladies'-tresses is found in moist to very wet meadows, along streams, in abandoned stream meanders, and near springs, seeps, and lake shores. It grows in sandy or loamy soils that are typically mixed with gravels. In Utah the species ranges in elevation from 4,301 to 7,001 feet. Populations have been documented in wetlands near Utah Lake in northern Utah (two populations) and in low-elevation riparian areas in the Colorado River drainage in eastern Utah (six populations) (USFWS 1992). The species occurs in Garfield and Wayne counties within the planning area.

A member of the orchid family, Ute ladies'-tresses is a perennial herb with a flowering stem (8-20 inches tall) that rises from a basal rosette of grass-like leaves. The flowers are ivory-colored, arranged in a spike at the top of the stem, and bloom mainly from late July through August. Recovery objectives for the species are documented in the Ute ladies'-tresses recovery plan (USFWS 1995b).

Threats to the species include loss of habitat from fragmentation of land from conversion to suburban and urban areas and management of water and stream systems for municipal, agriculture, and recreation uses (USFWS 1995b).

3.3.8.1.13 Maguire Daisy

Maguire daisy is a Federally-listed threatened plant that occurs in Emery, Garfield, and Wayne counties. The species grows on the sand and rubble weathered from Wingate, Chinle and Navajo Sandstone and,

rarely, the Kayenta Formation (Utah Native Plant Society 2004 and Clark and Clark 1999). It is found in slickrock-crevices, on ledges, and in the bottoms of washes, at elevations ranging from 5,248 to 8,200 feet (Clark and Clark 1999). In 1996, Maguire daisy was downlisted from endangered to threatened based on the discovery of 12 additional populations. Threats to existing Maguire daisy populations are primarily from OHV use and livestock trampling (USFWS 1995d).

3.3.8.2 BLM Sensitive Species

Table 3-16 identifies those non-listed special status plant and animal species that are known or thought to occur on public lands administered by the RFO (IM-UT 2003-027). The Utah BLM Sensitive Species list changes periodically and is updated accordingly with species being added to or deleted from the list. Changes to the Utah BLM Sensitive Species list would be incorporated into the RFO RMP as they occur.

Table 3-16. Non-Listed Special Status Species

Common Name	Scientific Name	Utah DWR Status and Utah BLM Sensitive Species Status
Mollusks		
California Floater	<i>Anodonta californiensis</i>	Sensitive
Amphibians		
Boreal Toad	<i>Bufo boreas</i>	Sensitive
Columbia Spotted Frog	<i>Rana luteiventris</i>	Conservation species
Birds		
Ferruginous Hawk	<i>Buteo regalis</i>	Sensitive
Greater Sage Grouse	<i>Centrocercus urophasianus</i>	Sensitive
Long-Billed Curlew	<i>Numenius americanus</i>	Sensitive
Western Yellow-Billed Cuckoo	<i>Coccyzus americanus</i>	Candidate
Burrowing Owl	<i>Speotyto cunicularia</i>	Sensitive
Short-Eared Owl	<i>Asio flammeus</i>	Sensitive
Black Swift	<i>Cypseloides niger</i>	Sensitive
Lewis' Woodpecker	<i>Melanerpes lewis</i>	Sensitive
Three-Toed Woodpecker	<i>Picoides tridactylus</i>	Sensitive
Northern Goshawk	<i>Accipiter gentilis</i>	Conservation species
Grasshopper Sparrow	<i>Ammodramus savannarum</i>	Species of special concern
Mammals		
Fringed Myotis	<i>Myotis thysanodes</i>	Species of special concern
Western Red Bat	<i>Lasiurus blossevillii</i>	Sensitive
Spotted Bat	<i>Euderma maculatum</i>	Sensitive
Townsend's Big-Eared Bat	<i>Corynorhinus townsendii</i>	Sensitive
Allen's Big-Eared Bat	<i>Idionycteris phyllotis</i>	Sensitive
Big Free-Tailed Bat	<i>Nyctinomops macrotis</i>	Sensitive
Pygmy Rabbit	<i>Brachylagus idahoensis</i>	Sensitive
Fish		
Bonneville Cutthroat Trout	<i>Oncorhynchus clarki utah</i>	Conservation species
Colorado River Cutthroat Trout	<i>Oncorhynchus clarki pleuriticus</i>	Conservation species
Leatherside Chub	<i>Gila copei</i>	Sensitive
Roundtail Chub	<i>Gila robusta</i>	Conservation Species
Bluehead Sucker	<i>Catostomus discobolus</i>	Conservation Species
Flannelmouth Sucker	<i>Catostomus latipinnis</i>	Conservation Species

Common Name	Scientific Name	Utah DWR Status and Utah BLM Sensitive Species Status
Plants		
Rabbit Valley Gilia, also known as Alice's Wonder Flower	<i>Gilia caespitosa</i> or <i>Alicellia caespitosa</i>	Candidate
Utah Phacelia	<i>Phacelia utahensis</i>	Sensitive
Basalt Milkvetch	<i>Astragalus subcinereus</i> var. <i>basalticus</i>	Sensitive
Pinnate Spring Parsley	<i>Cymopterus beckii</i>	Sensitive
Hole-in-the-Rock Prairie-Clover	<i>Dalea flavescens</i> var. <i>epica</i>	Sensitive
Cronquist Wild Buckwheat	<i>Eriogonum corymbosum</i> var. <i>cronquistii</i>	Sensitive
Smith Wild Buckwheat	<i>Eriogonum corymbosum</i> var. <i>smithii</i>	Sensitive
Utah Spurge	<i>Euphorbia nephradenia</i>	Sensitive
Cataract Gilia	<i>Gilia latifolia</i> var. <i>imperialis</i>	Sensitive
Mussentuchit Gilia	<i>Gilia tenuis</i> Also known as <i>Alicillia tenuis</i>	Sensitive
Alcove Bog-Orchid	<i>Habenaria zothecina</i>	Sensitive
Greenwood's Goldenbush	<i>Haplopappus lignumviridis</i>	Sensitive
Claron Pepperplant	<i>Lepidium montanum</i> var. <i>claronense</i>	Sensitive
Jane's Globemallow	<i>Sphaeralcea janeae</i>	Sensitive
Psoralea Globemallow	<i>Sphaeralcea psoraloides</i>	Sensitive
Alpine Greenthread	<i>Thelesperma subnudum</i> var. <i>alpinum</i> also known as <i>Thelesperma windhamii</i>	Sensitive
Sigurd Townsendia	<i>Townsendia jonesii</i> var. <i>lutea</i>	Sensitive

Unless otherwise noted, the information presented below for non-listed special status plant and animal species comes from the Utah Division of Wildlife Resources web site (www.wildlife.utah.gov). Additional information on these species can be obtained at this site.

3.3.8.2.1 Mollusks

3.3.8.2.1.1 California floater (*Anadonta californiensis*)

The California floater has not been positively identified as occurring with the RFO; however, potential habitat does occur for this species in certain aquatic areas. At least two extant occurrences are known in Utah. These occurrences are in Utah and Millard Counties. Known habitat ranges from muddy bottoms with depths of 6 to 10 inches among watercress to creeks five to fifteen feet wide, up to 18 inches deep, with a bottom of gravel and sand in flowing areas and mud in pools. It is thought that populations of this species may be declining due to pesticides in agricultural run-off, habitat degradation by cattle, and water diversion.

3.3.8.2.2 Amphibians

3.3.8.2.2.1 Boreal toad (*Bufo boreas*)

Often known as the Western toad, this species is widely scattered throughout the northwestern United States and Canada. It is found throughout much of Utah in a variety of habitats, including slow moving streams, wetlands, desert springs, ponds, lakes, meadows, and woodlands. Many of these habitats are located on lands administered by the RFO.

3.3.8.2.2.2 Columbia spotted frog (*Rana luteiventris*)

This species is on the UDWR Sensitive Species List (UDWR 2003) as a Conservation Species, and a multi-agency conservation agreement was completed in 1998. In Utah, isolated Columbia spotted frog populations exist in the West Desert and along the Wasatch Front. Within these regions, populations are tied to aquatic habitat and perennial sources of water (Bosworth 2003). UDWR has documented populations of Columbia spotted frog in Sanpete, Sevier, Piute, Wayne, and Garfield counties.

Adult frogs eat a wide variety of food items, ranging from insects to snails, whereas tadpoles eat algae, plants, and small aquatic organisms. Typically, breeding sites have little or no current and are surrounded by dense aquatic vegetation. The Columbia spotted frog breeds as early in the spring as winter thaw allows, with eggs hatching in 3-21 days depending on temperature. During cold winter months, spotted frogs burrow in the mud and become inactive.

Populations are vulnerable to the loss and degradation of aquatic habitat. Historically, wetland destruction associated with development as well as water withdrawal, pollution, livestock use, or competition from non-native species have contributed to the species' decline (UDWR 2005a, NatureServe 2004).

3.3.8.2.3 Birds

3.3.8.2.3.1 Ferruginous hawk (*Buteo regalis*)

This species is distributed throughout much of Utah, although it is rare and productivity may not be sufficient to maintain the State's populations. Use of nesting substrate varies throughout this species' range and includes trees, shrubs, cliffs, utility structures, and ground outcrops. Haystacks and abandoned buildings have also been used. Ferruginous hawk density varies regionally as well as temporally as prey densities vary. Their primary food source is small mammals such as rabbits and hares, prairie dogs, pocket gophers, etc. Ferruginous hawk habitat is found in much of the area administered by the RFO. Threats include human disturbance (recreation, mineral development, etc.) and loss of preferred pinyon-juniper woodland habitats. The species is prone to abandon nest sites with low levels of human disturbance.

3.3.8.2.3.2 Greater sage grouse (*Centrocercus urophasianus*)

This species inhabits sagebrush plains, foothills, and mountain valleys. Sagebrush is the predominant plant of quality habitat. The largest population of Greater sage grouse in Utah is found in Wayne County. The species is also distributed throughout Sanpete, Sevier, Piute, and Garfield counties in areas dominated by sagebrush. Understory of grasses and forbs, and associated wet meadow areas, are essential for optimum habitat. The Greater sage grouse is a granivore, herbivore, and insectivore and is associated with both tall and short sagebrush types. Sage grouse use the same breeding grounds, or "leks," over several consecutive breeding seasons. Greater sage grouse are ground nesters and are susceptible to predators and human disturbance including mineral exploration and development and OHV use. Additional threats to the species include habitat loss, invasive plants, and conversion of large areas from shrub steppe to non-native grasslands (UDWR 2005a, NatureServe 2004).

3.3.8.2.3.3 Long-billed Curlew (*Numenius americanus*)

In Utah, this species is a fairly common summer resident and migrant. The curlew lives and breeds in higher and drier meadowlands than many other shorebird species. Uncultivated rangelands and pastures located within the planning area support the majority of breeding populations. Food sources include crustaceans, mollusks, worms, toads, insects, and sometimes berries. According to the UDWR, long-billed curlews have four essential nesting habitat requirements, (1) short grass, less than 30 cm tall, (2) bare ground components, (3) shade, and (4) abundant vertebrate prey.

3.3.8.2.3.4 Western yellow-billed cuckoo (*Coccyzus americanus*)

This species is considered a riparian obligate and is usually found in large tracts of dense cottonwood/willow habitats (below 33 feet in height). Population status and trends within the planning area are unknown. However a pair of yellow-billed cuckoos was heard during breeding season before 1983. More recent breeding has been recorded outside the planning area. Yellow-billed cuckoo nesting behavior may be closely tied to food abundance. The species is one of the latest migrants to arrive and breed in Utah. The yellow-billed cuckoos arrive in late May or early June and breed in late June through July. Nesting habitat is classified as dense lowland riparian characterized by a dense subcanopy or shrub layer (regenerating canopy trees, willows, or other riparian shrubs) within 333 feet of water. Threats to the species include the alteration of riparian corridors from invasive species, livestock use, and development (UDWR 2005a, NatureServe 2004).

3.3.8.2.3.5 Burrowing owl (*Speotyto cunicularia*)

This species prefers open areas within deserts, grasslands, and sagebrush steppe communities. Both primary and secondary breeding habitat exists in Sanpete, Sevier, Piute, Wayne, and Garfield counties. Habitat consists of well-drained, level-to-gently-sloping areas characterized by sparse vegetation and bare ground, such as moderately or heavily grazed pasture. Burrowing owls breed in native prairie as well as in cultivated pasture, hay fields, fallow fields, road and railroad rights-of-way (ROWs), and in a number of urban habitats. They are obligate nesters that nest in ground burrows of prairie dogs or other burrowing mammals. Threats to the population include habitat loss, declining prairie dog populations, and pesticides (UDWR 2005a, NatureServe 2004).

3.3.8.2.3.6 Short-eared owl (*Asio flammeus*)

This is a medium sized owl that frequently flies during daylight, especially at dusk and dawn, as it forages for rodents. The short-eared owl is usually found in grasslands, shrublands, and other open habitats which are common in the RFO. It is nomadic, often choosing a new breeding site each year, depending on local rodent densities. The owls nest on the ground in a small depression that is usually lined with a small amount of grass and other plant material. There is some concern that short-eared owl populations are declining in Utah.

3.3.8.2.3.7 Black swift (*Cypseloides niger*)

The black swift occurs in mountainous regions of the western United States and Canada. Little is known of the historic range of this species. Currently, black swifts occur in three widely separated areas, one of which is central Colorado through central Utah. They are thought to be extremely rare in Utah with only two confirmed breeding locations. Black swifts are aerial insectivores and feed exclusively on flying insects. They nest in small colonies near and often behind waterfalls. Adults are long-lived. Nesting sites are typically surrounded by coniferous forests, often mixed conifer or spruce-fir forests. The preferred habitat for the black swift is limited in the RFO.

3.3.8.2.3.8 Lewis's woodpecker (*Melanerpes lewis*)

This species ranges from southern British Columbia to its wintering grounds in northwestern Mexico. In Utah, it is primarily found in the central part of the State. The Lewis's woodpecker is a cavity nester, excavating a hole in tall trees, often dead or blackened by fire. It will also nest in utility poles or stumps, but prefers ponderosa pine, cottonwood, or sycamore, all of which are found within the RFO. The diet of this woodpecker consists of insects, nuts, and berries depending on the time of the year. Areas with a good understory of grasses and shrubs to support insect prey populations are preferred.

3.3.8.2.3.9 American three-toed woodpecker (*Picoides dorsalis*)

This species of woodpecker extends from Canada through Utah and into New Mexico. It is found in Engelmann spruce, sub-alpine fir, Douglas fir, ponderosa pine, tamarack, aspen and lodgepole pine forests. This woodpecker tends to stay in its territory year-round though insect outbreaks, such as spruce bark beetle infestations may cause irregular movements. Habitat of the American three-toed woodpecker is found in the higher elevations of the RFO.

3.3.8.2.3.10 Northern goshawk (*Accipiter gentilis*)

The northern goshawk is found in much of the northern hemisphere. It is a permanent resident in Utah, but is not common in the State. The hawk prefers mature mountain forest and riparian zone habitats, both of which are found in the planning area. Nests are constructed in trees in mature forests. Often nests previously used by northern goshawks or other bird species are reused. This species cruises low through forested areas and also perches to hunt prey. Major prey includes rabbits, hares, squirrels, and birds.

3.3.8.2.3.11 Grasshopper sparrow (*Ammodramus savannarum*)

This species of sparrow is a grasslands bird; therefore potential habitat is limited in the RFO. In Utah, breeding populations have been found only in the northern parts of the State. Nests are built of grass on the ground at the base of grass clumps. As its name implies, this species' primary diet is grasshoppers.

3.3.8.2.4 Mammals

3.3.8.2.4.1 Fringed myotis (*Myotis thysanodes*)

This small bat is found in much of the western United States. It is widely distributed throughout Utah, but is not very common in the State. The fringed myotis commonly inhabits caves, mines, and buildings, most often in desert and woodland areas which are common in the RFO. Beetles are the major prey for this species.

3.3.8.2.4.2 Western red bat (*Lasiurus blossevilli*)

The Western red bat is found in the western United States. It is extremely rare in Utah being known from only a few locations in the State. As a result, it is included on the DWR Sensitive Species List. This species of bat is normally found near water, often in wooded areas. While some individuals hibernate during cold times, most will migrate south to warmer climates for the winter. The species is nocturnal. It feeds on insects, often foraging near riparian areas.

3.3.8.2.4.3 Spotted bat (*Euderma maculatum*)

This species occurs throughout much of the western United States. It is found state-wide in Utah, but has probably never been abundant in any particular location. The spotted bat may be found in a variety of habitats, ranging from deserts to forested mountains. It roosts and hibernates in caves and rock crevices. These types of habitats are scattered throughout the RFO. Spotted bats eat insects, primarily moths, which are captured in flight. Current data suggest that populations of this species may be declining in Utah. Consequently the spotted bat is now included on the DWR Sensitive Species List

3.3.8.2.4.4 Townsend's big-eared bat (*Corynorhinus stownsendii*)

This species occurs in western North America from southwestern Canada to Mexico. In Utah, it occurs state-wide at elevations below 9,000 feet. Townsend's big-eared bat can be found in many types of habitat, but is often found near forested areas. Caves, mines and buildings are used for day roosting and winter hibernation. The species is nocturnal and individuals typically do not leave their roosts until well

after sunset. This species is thought to be declining in population in Utah due to human disturbances of caves and the closures of abandoned mines.

3.3.8.2.4.5 Allen’s big-eared bat (*Idionycteris phyllotis*)

Allen’s big-eared bat is one of the most poorly known bat species in North America. It was not known from Utah until 1969. It is known to occur only in the southern portion of the State. Because of its rarity, this species is included on the DWR Utah Sensitive Species List. Preferred habitats include rocky and riparian areas in woodland and scrubland regions. Allen’s big-eared bat is an insectivore, eating insects captured in flight or plucked from vegetation. It is nocturnal, roosting in caves or rock crevices during the day.

3.3.8.2.4.6 Big free-tailed bat (*Nyctinoomops macrotis*)

This species is found in the western United States. It is rare in Utah, occurring primarily in the southern half of the State. The big free-tailed bat prefers rocky and woodland habitats. Roosting occurs in caves, mines, old buildings, and rock crevices. It is typically active year-round, migrating to warmer areas in the south during the winter months. This species eats insects, primarily moths.

3.3.8.2.4.7 Pygmy rabbit (*Brachylagus idahoensis*)

This species can be found throughout Utah including within the RFO. The species prefers areas with tall dense sagebrush and loose soils. Pygmy rabbits occur in isolated patches because of their specific life history requirements. Their habitat consists of deep soils and tall, dense sagebrush and high shrub cover. Pygmy rabbits are active throughout the year and are most often above ground near dawn and dusk. Inactive periods are spent in underground burrows. Pygmy rabbits depend on sagebrush for their winter diets and during summer shift to more grasses and forbs. Declines in population are related to the degradation or loss of sagebrush steppe habitat.

3.3.8.2.5 Fish

3.3.8.2.5.1 Bonneville cutthroat trout (*Oncorhynchus clarki utah*)

The Bonneville cutthroat trout is a subspecies of the cutthroat trout native to the Bonneville Basin of Utah, Wyoming, Idaho, and Nevada. Pure Bonneville cutthroat trout are rare throughout their historic habitat but several populations in Utah do exist, including populations located within the RFO. Major threats to this species include habitat loss/alterations, predation by and competition with nonnative fishes, and hybridization with nonnative fishes, such as the rainbow trout. This species feeds primarily on insects, but large individuals also eat fishes. It can be found in a variety of habitats ranging from high-elevation mountain streams and lakes to low-elevation grassland streams. In all of these habitat types, the Bonneville cutthroat trout requires a functioning stream riparian zone which provides structure, cover, shade, and bank stability.

3.3.8.2.5.2 Colorado River cutthroat trout (*Oncorhynchus clarki pleuriticus*)

This species is a race, or subspecies, of the cutthroat trout that is native to the upper Colorado River drainage of Utah, Wyoming, Colorado, Arizona, and New Mexico. This subspecies is restricted to the upper Colorado River drainage and occurs in headwater streams and mountain lakes of the Uinta, La Sal, and Abajo mountains; the Tavaputs Plateau; and the Escalante and Fremont river drainages (Bosworth 2003). UDWR has documented cutthroat trout populations within Sevier, Wayne, and Garfield counties within the planning area (UDWR 2005a).

The Colorado River cutthroat trout primarily eats invertebrates, but adults also eat small fishes. Like other cutthroat trout, the subspecies spawns in streams over gravel substrate in the spring. The cool, clear

water of high-elevation streams and lakes is the preferred habitat for Colorado River cutthroat trout (Bosworth 2003).

Threats to the species include land and water use activities such as grazing, mining, and the construction of water impoundments, as well as the introduction of nonnative fish. In addition, fragmentation of metapopulations, which affects gene flow and seasonal movements, is thought to be an especially important factor in population declines (Bosworth 2003). UDWR is currently working to restore pure Colorado River cutthroat trout to historic areas in Utah. Since 1999, large numbers of Colorado River cutthroat trout have been raised in hatcheries and then released into lakes in the Uinta Mountains in the northeastern part of the state.

3.3.8.2.5.3 Leatherside chub (*Gilia copei*)

This species is a small minnow native to streams and rivers of the southwestern portion of the Bonneville Basin. The leatherside chub was once common throughout its native range but presently is listed as a State sensitive species due to substantial decreases in population levels. There are three general population areas in Utah, the largest of which includes portions of the RFO.

3.3.8.2.5.4 Roundtail chub (*Gilia robusta*)

This species is a fairly large minnow native to the Colorado River system of the western United States. It prefers large rivers and is most often found in murky pools near strong currents in the main-stem Colorado River and tributaries. Locally common in places, the roundtail chub has been reduced in numbers and distribution due to flow alteration and the introduction of exotic fishes. It eats terrestrial and aquatic insects, mollusks, and other invertebrates, fishes, and algae.

3.3.8.2.5.5 Bluehead sucker (*Catostomus discobolus*)

The bluehead sucker is native to parts of Utah, Idaho, Arizona, New Mexico, and Wyoming. Specifically, the species occurs in the upper Colorado River system, the Snake River system, and the Lake Bonneville Basin. In Utah, bluehead suckers have been reduced in numbers and distribution due to stream flow alteration, habitat loss/alteration, and the introduction of nonnative fishes. It is a benthic (bottom dwelling) species with a mouth modified to scrape algae from the surface of rocks. Fast flowing water in high gradient reaches of mountain rivers has been identified as important habitat for this species.

3.3.8.2.5.6 Flannelmouth sucker (*Catostomus latipinnis*)

This species is native to the Colorado River system of the western United States and northern Mexico. In Utah, the species occurs in the main-stem Colorado River and in many of the Colorado's large tributaries. Flannelmouth suckers are usually absent from impoundments. The species prefers large rivers where they are often found in deep pools of slow flowing, low gradient reaches. The sucker is a benthic (bottom dwelling) fish that primarily eats algae. Invertebrates and many types of plant matter are also consumed. In recent times, Utah flannelmouth sucker populations have been reduced in both numbers and distribution, primarily due to flow alteration, habitat loss/alteration, and the introduction of nonnative fishes.

3.3.8.2.6 Plants

3.3.8.2.6.1 Rabbit Valley gilia (*Gilia caespitosa* or *Alicellia caespitosa*)

Rabbit Valley gilia (also known as Alice's wonder flower) is a Federal candidate for listing under the ESA and occurs in Wayne County. Rabbit Valley gilia is primarily associated with Navajo Sandstone and to a lesser extent the Kayenta and Wingate formations. Growing in sand-filled crevices, sand pockets, and on detrital slopes, it is found in open pinyon-juniper woodlands, often mixed with mountain

brush, sagebrush, or ponderosa pine, at elevations ranging from 5,198 to 8,997 feet (Clark and Clark 1999). Rabbit Valley gilia is known from 15 populations scattered over a distance of about 19 miles near the Fremont River from the northern portion of the Waterpocket Fold westward to Rabbit Valley in Wayne County, an area locally known as Wayne Wonderland. Threats to the population include plant collection and trampling associated with recreation and livestock grazing (NatureServe 2004).

3.3.8.2.6.2 Utah phacelia (*Phacelia utahensis*)

This is a central Utah endemic species that occurs in portions of Sanpete and Sevier Counties. It is found on often-precipitous, barren slopes of the Arapien Shale Formation. The plant grows in desert shrub and pinyon-juniper woodland communities. Alder-leaf mountain mahogany, shadscale, and Utah greasebush communities are also known to contain populations. The plant is located at elevations between 5,500 and 6,200 feet in elevation. Evidence of gypsum mining has been observed over much of the habitat, and the plants were never observed occupying disturbed locations. Livestock grazing and off-highway vehicle use are present but due to the often steep habitat, are not a concern at all locations. The recent discovery of oil in the Sevier Valley may add another potential impact to this plant's habitat (Utah Native Plant Society 2007, UDWR 2005d).

3.3.8.2.6.3 Basalt (or Silver) milkvetch (*Astragalus subcinereus* var. *basalticus*)

The basalt milkvetch is found in eastern Sevier and western Garfield and Emery Counties in Utah. It prefers pinyon-juniper woodland and ponderosa pine communities on igneous gravels between 4,500 and 8,000 feet in elevation (Utah Native Plant Society 2007).

3.3.8.2.6.4 Pinnate spring parsley (*Cymopterus beckii*)

This species is found in pinyon-juniper woodland, mountain brush, ponderosa pine/Manzanita, conifer/oak, and Douglas fir communities in sandy or stony soils. It is often found in rock crevices and near cliff bases on north and east exposures between 5,600 and 7,500 feet in elevation. It is endemic to San Juan and Wayne Counties in Utah and Navajo Tribal Lands in Arizona (Utah Native Plant Society 2007).

3.3.8.2.6.5 Hole-in-the-Rock prairie-clover (*Dalea flavescens* var. *epica*)

This species is endemic to Utah in Carbon, Emery, Garfield, Kane, San Juan, and Wayne Counties. It grows on sandstone bedrock and sandy areas in blackbrush and mixed desert shrub communities between 4,700 and 5,000 feet in elevation (Utah Native Plant Society 2007).

3.3.8.2.6.6 Cronquist wild buckwheat (*Eriogonum corymbosum* var. *cronquistii*)

Cronquist wild buckwheat is endemic to the Henry Mountains in Garfield and Wayne Counties in Utah. It is found almost entirely on public lands administered by the BLM RFO. The species prefers pinyon, *Holodiscus*, rabbitbrush, mountain brush, and rock-spirea communities. It occurs on steep talus slopes between 8,800 and 8,900 feet in elevation (Utah Native Plant Society 2007).

3.3.8.2.6.7 Smith (or Flat Tops) wild buckwheat (*Eriogonum corymbosum* var. *smithii*)

This species is located in the San Rafael Desert portion of Emery and Wayne Counties in Utah. It is a Colorado Plateau endemic. The plant is a perennial shrub with bright yellow flowers and shiny green leaves. It is found in purple sage, matchweed, Ephedra-Indian rice grass, desert shrub, and rabbitbrush communities on the Entrada Formation and on stabilized sand dunes between 4,500 and 5,600 feet in elevation. Livestock currently graze in the habitat of this species but do not appear to be a threat to the plant. The potential also exists for oil and gas related activity to occur within the habitat of this species (Utah Native Plant Society 2007; UDWR 2007).

3.3.8.2.6.8 Utah spurge (*Euphorbia nephradenia*)

Endemic to the Colorado Plateau, the Utah spurge is found in Emery, Garfield, Kane, and Wayne Counties. It is found in mat saltbush, blackbrush, Ephedra, mixed sandy desert shrub, and grassland communities on dark clay hills, blow sand and stabilized dunes mainly on Tropic Shale and Entrada formations between 3,800 and 4,800 feet in elevation (Utah Native Plant Society 2007).

3.3.8.2.6.9 Cataract gilia (*Gilia latifolia* var. *imperialis*)

Cataract gilia is endemic to Emery, Garfield, Grand, Kane, San Juan, and Wayne Counties, Utah. It is found in shadscale and other mixed desert shrub communities, especially in wash bottoms and at the bases of ledges between 3,800 and 5,200 feet in elevation (Utah Native Plant Society 2007).

3.3.8.2.6.10 Mussentuchit Gilia (*Gilia tenuis*)

This species is known from seven locations in Emery and Sevier counties (NatureServe 2004 and Utah Native Plant Society 2004). The species is restricted to a discontinuous stretch of habitat of sandstone outcrops and sandy slopes in association with mountain brush, pinyon-juniper woodlands, and cushion plants (NatureServe 2004). Often Mussentuchit gilia is located on material derived from the Curtis Formation and the Dakota and Navajo sandstones, between 5,198 to 7,117 feet in elevation (Welsh *et al.* 1993 and Utah Native Plant Society 2004). The number of individuals is not recorded for the population located within the planning area, and no threats have been identified to either the populations or habitat (UNHP 2004, NatureServe 2004).

3.3.8.2.6.11 Alcove bog-orchid (*Habenaria zothecina*)

Alcove bog-orchid is located in Emery, Garfield, Grand, San Juan, and Uintah Counties in Utah and in Arizona and Colorado. It is found in seeps, hanging gardens, and moist stream banks in mixed desert shrub, pinyon-juniper woodland, and oak brush communities between 4,000 and 6,200 feet in elevation (Utah Native Plant Society 2007).

3.3.8.2.6.12 Greenwood's goldenbush (*Haplopappus lignumviridis*)

The habitat of this very rare species is restricted to riparian areas with willows, nettles and *Conyza* in Sevier County, Utah. It is found at about 6,200 feet in elevation (Utah Native Plant Society 2007).

3.3.8.2.6.13 Claron pepperplant (*Lepidium montanum* var. *carotenes*)

The Claron pepperplant is endemic to the Paunsaugunt and Table Cliff Plateau in Garfield, Kane, and Piute Counties in Utah. It is restricted to sagebrush, pinyon-juniper woodland communities, and ponderosa pine/bristlecone pine communities on the Claron member of the Wasatch Limestone Formation and other fine textured substrates between 6,400 and 8,000 feet in elevation (Utah Native Plant Society 2007).

3.3.8.2.6.14 Jane's globemallow (*Sphaeralcea janeae*)

This rare species is endemic to Wayne and San Juan Counties in Utah. It prefers warm and salt desert shrub communities on the White Rim and Organ Rock members of the Cutler Formation between 4,000 and 4,600 feet in elevation (Utah Native Plant Society 2007).

3.3.8.2.6.15 Psoralea globemallow (*Sphaeralcea psoraloides*)

This species is a Colorado Plateau endemic found on the southeastern footslopes of the San Rafael Swell in Wayne and Emery Counties, Utah. It is typically found in *Zuckia-Ephedra*, shadscale, *Eriogonum*, *Lepidium*, and pinyon-juniper woodland communities. Soil types on which the psoralea globemallow is found include saline and gypsiferous Mancos Shale, Buckhorn Conglomerate, Curtis sandstone, Entrada

siltstone, Carmel, and Kaibab Limestone between 4,000 and 6,300 feet in elevation. Researchers visiting populations of this species have noted off-highway vehicle use, grazing, recreation, exotic weed encroachment, mining and urbanization occurring within the habitat. However, the species appears to be stable at this time (Utah Native Plant Society 2007, UDWR 2005d).

3.3.8.2.6.16 Alpine greenthread (*Thelesperma subnudum* var. *alpinum* also known as *Thelesperma windhamii*)

The alpine greenthread is a rare species endemic to portions of Wayne County, Utah. It occurs in pinyon-juniper communities, mountain brush, and western bristlecone pine communities. The plant grows in sandy soil pockets, cracks of slickrock, and on ledges and clay flats on Carmel Limestone and Navajo Sandstone between 6,000 and 8,000 feet in elevation. The known populations of this species are fairly isolated (Utah Native Plant Society 2007; UDWR 2005d).

3.3.8.2.6.17 Sigurd townsendia (*Townsendia jonesii* var. *lutea*)

This very rare species is found in Juab, Piute, Sanpete, and Sevier Counties in Utah. Its habitat is salt desert, mixed desert shrub, and juniper-sagebrush communities on Arapien shale and clays in volcanic rubble at 3,500 to 6,300 feet elevation (Utah Native Plant Society 2007).

3.3.9 Fish and Wildlife

The BLM manages public lands to provide habitat for fish and wildlife. The diverse ecosystems and mosaic landscapes of the lands managed by the RFO provide habitat for more than 600 species of fish and wildlife. Fish and wildlife habitat are managed according to principles outlined by *Utah Fish and Wildlife 2000* (BLM 1993b). The BLM implements this general guidance through specific management actions associated with species located in the public lands managed by the RFO.

The BLM manages wildlife habitat, and the UDWR manages wildlife populations. To the extent practicable, the BLM collaborates with UDWR to achieve the habitat management goals and objectives of the various UDWR Wildlife Management Unit Plans, as well as species-specific management plans, by providing appropriate quantities and quality of habitats on public lands, consistent with the principles of multiple-use management. These habitats reflect the influence of various past and ongoing human activities and disturbances, resulting in significant increases in some species populations, declines in others, and the modification of large blocks of habitat. The habitats and the wildlife species that rely on them rarely exist solely on BLM lands and often extend across administrative boundaries to other Federal, state, and private lands.

Fish and wildlife species can be broadly defined into two management categories that reflect preferences in public interest. Some species, commonly called game species, are economically important for hunting, fishing, and wildlife viewing opportunities. Others that do not have direct economic importance for hunting and fishing are referred to as non-game species. Both categories have economic importance that varies locally and nationally. Species not specifically discussed in this plan are also important and contribute to the diversity and health of plant and animal communities on public land. Many species fill ecological roles that are important but not fully understood.

3.3.9.1 Fish and Fisheries Habitat

Fisheries habitat includes perennial and intermittent streams and flat water (e.g., lakes and reservoirs) that support fish through at least a portion of the year. The condition of fisheries habitat is related to riparian habitat and stream channel characteristics. Riparian vegetation moderates water temperatures and provides bank structures that reduce erosion and provide overhead vegetation cover for fish. Intact

riparian communities also serve to slow overland flow, capture sediments, and provide a filter that enhances water quality. Water quality, especially concerning such factors as sediment, temperature, and dissolved oxygen, also greatly affects fisheries habitat.

Streams and lakes in the RFO provide habitat for at least 30 species of warm- and cool- to cold-water fish species, with 18 of these considered to be game fish (Sigler and Sigler 1996). Past stocking efforts have established many non-native fish species in streams, lakes, and reservoirs. Aquatic invertebrates and amphibians are integral components of all fish communities.

The factors limiting or affecting fish habitat in the RFO include excess siltation, stream dewatering, riparian areas in less than proper functioning condition, livestock impacts, and past mining practices. Factors limiting or affecting native fish production include competition and predation from non-native species, stream dewatering, hybridization, fish loss through irrigation diversions, excess siltation, and isolation of populations.

3.3.9.2 Wildlife and Wildlife Habitat

Wildlife habitat can be segregated into seven types: desert shrub, sagebrush steppe, pinyon-juniper woodland, forested, riparian/wetland, aspen, and non-vegetated (cliff talus). These habitat types are used as a basis for describing existing conditions, focusing on a broader scale approach as opposed to single-species management.

Livestock grazing, fire suppression, development patterns, natural conditions, and introduced plant species have influenced the condition of the habitats. Focusing management on habitat condition and composition has a more widespread effect on wildlife species than when focused on an individual species. Disturbances enhance habitat for some species but limit opportunities for others. Generally, disturbances promote use by mobile species or species that tolerate a broad range of habitat conditions. The availability of habitat may vary during the year as a result of elevation, aspect, and proximity of disturbance. Habitat use is also limited by wildlife species' different levels of social tolerance and by learned or inherent behavior. These factors may limit movement of wildlife species into new habitats, even if the habitat appears suitable for the species' needs.

Wildlife habitat needs vary significantly by species. It is generally true that healthy and sustainable wildlife populations can be supported where there is a diverse mix of vegetation communities to supply structure, forage, cover, and other specific habitat requirements.

3.3.9.2.1 Desert Shrub

Desert shrub includes numerous upland vegetation communities with a shrubland component and a variable understory of grass and forbs. Desert shrub contains a large number of reptile species. A variety of other wildlife occupies salt desert habitats. Herbaceous plants are vital to the majority of all wildlife species through providing food, cover, and structure. Shrub cover helps wildlife survive the rigors of summer heat and winter cold. It supplies browse, seeds, and cover for birds and small and large mammals. Intermingled areas of desert grasslands add diversity to vegetation and habitat structure in desert shrub communities.

3.3.9.2.2 Sagebrush Steppe

Sagebrush habitat is prevalent in the western and central portions of the RFO. At mid to lower elevations, Wyoming big sagebrush is the dominant vegetation type, providing important winter habitat for highly mobile wildlife species (e.g., mule deer, pronghorn antelope, and greater sage grouse) and localized

yearlong habitat for sagebrush-obligate species (e.g., pygmy rabbit). Sagebrush also provides crucial breeding, nesting, and brood-rearing habitat for these species. Intermingled occurrences of grasslands and several low sages add to the diversity of vegetation and habitat structure. Sagebrush-obligate species are restricted to sagebrush habitats during the breeding season or year round, and near-obligate species occur in both sagebrush and grassland habitats. As a result of the regional losses of sagebrush communities and the number of sagebrush-obligate wildlife, maintenance and improvement of existing sagebrush habitat is crucial for community structure and diversity and for providing critical habitat for obligate species.

3.3.9.2.3 Pinyon-Juniper Woodlands

Pinyon-juniper woodlands are widely dispersed and have expanded into sagebrush and other vegetation communities. Pinyon-juniper woodlands provide some wildlife habitat. Although understory vegetation is reduced beneath pinyon-juniper stands, pinyon-juniper woodlands provide greater structural diversity than desert shrub or sagebrush steppe shrubland habitats.

3.3.9.2.4 Forested Areas

Coniferous habitats are a small but important habitat component within the RFO and are primarily located along national forest boundaries and in the Henry Mountains. Forested habitats, which contain security areas (e.g., hiding cover) for big game species, can provide important linkage corridors for wildlife movement between other seasonal habitats.

3.3.9.2.5 Riparian Ecosystems

Riparian habitats are crucial components in the landscape. They serve as important use areas for wildlife in providing various life cycle requirements such as foraging, nesting, roosting, and hiding cover, as well as travel corridors for numerous highly mobile species. Usually a high degree of plant diversity occurs along riparian corridors, exhibiting variable density and composition, allowing both openness and ground cover. Invasive species, such as tamarisk, are affecting the health of riparian systems, shifting the systems to a vegetation monoculture.

3.3.9.2.6 Aspen

Aspen stands provide habitat for many wildlife species. Many predaceous birds are adapted to aspen forest and the adjacent open brush, meadows, and grasslands. Aspen ecosystems provide cover, calving, and fawning habitat for big game, and nesting habitat for migratory birds.

3.3.9.2.7 Non-Vegetated (Cliff Talus)

Talus slopes are accumulations of angular rock debris at the bases of cliffs or steep slopes. Talus provides wildlife species basking sites and crevices for hiding. Slopes with large boulders provide caves that may be large enough for a species such as bobcat to occupy. Cliffs are faces of vertical exposed rock that sometimes have a talus slope at their base. Several raptor species and non-perching birds, such as black swifts, use cliff and talus areas for nesting and brood-rearing habitat. Prairie falcons generally nest on rock outcrops and cliffs that range from 30 to 400 feet high. Canyon and rock wrens nest in the fractured talus slope below cliff faces, particularly in areas that are interspersed with open, patchy forests of ponderosa pine, Douglas fir, and sagebrush steppe communities.

3.3.9.3 Wildlife Species of Interest

Wildlife species of interest include big game animals, raptors, upland game birds, and other species. Big game populations are managed cooperatively by the BLM and UDWR based on habitat condition, long-term vegetative trends, annual monitoring of wildlife utilization levels, and the desired age class of animals produced in each Wildlife Management Unit. Wildlife Management Unit boundaries are established by UDWR to encompass the seasonal habitat requirements of large, free-roaming wildlife species, and they are frequently bounded by such physical features as ridgetops or drainages, or artificial features such as major roads or highways. Boundaries of Wildlife Management Units rarely match the administrative boundary of the RFO.

Seasonal habitats are mapped in the GIS and represent an outside perimeter within which a particular seasonal use could be expected to occur by a particular species. However the mapping is not precise because distribution varies annually as a result of weather, forage availability, and population size and distribution. Areas are included that do not provide for a particular use as a result of topography, different vegetation, or disturbances that are too small to map on a broad scale (e.g., north slopes on winter ranges, forested patches in sagebrush). The RFO includes all or portions of the following UDWR Wildlife Management Units—

- Beaver
- Central Mountains, Manti South
- Fillmore
- Henry Mountains
- Monroe
- Mount Dutton
- Plateau Boulder
- Plateau Fishlake
- Plateau Thousand Lake
- San Rafael

3.3.9.3.1 Game Wildlife Species

Crucial and high-value habitats for big game species are included within the RFO (Maps 3-5, 3-6 and 3-7). Crucial-value habitat is any range or habitat component that directly limits a community from reproducing or maintaining a certain population level over the long-term. Moderate-value and low-value habitat is abundant in the planning area, and includes any particular habitat that is common or of intermediate importance. Wildlife may be displaced due to development activities in these habitats.

3.3.9.3.2 Bison

The Henry Mountains contain the only free-roaming and huntable herd of American bison on public land in the 48 contiguous United States. The herd was transplanted to the San Rafael Desert in the 1940s and migrated into the Henry Mountains in the 1960s (Map 3-5). Bison are grazers, feeding mainly on grasses and other vegetation. Although bison typically give birth in spring, young may be born as late as midsummer. An annual hunt is held to maintain a harvest population of about 275 animals. Conflicts with livestock and bison grazing occur on allotments where both are present. Drought increases the potential for conflict between livestock and bison.

3.3.9.3.3 Bighorn Sheep

Desert bighorn sheep are found in the Dirty Devil portion of the San Rafael Wildlife Management Unit. Desert bighorn sheep, which are considered to be yearlong residents of their range, do not have seasonal ranges like mule deer and elk (Map 3-5). Bighorn sheep prefer very open vegetation types, such as low shrub, grassland, and other treeless types typically associated with steep talus and rubble slopes. Bighorn diets comprise a variety of shrubs, forbs, and grasses. Bighorn sheep lambing occurs on steep talus slopes, typically within one to two miles of reliable water sources.

Bighorn sheep are extremely vulnerable to a variety of viral and bacterial diseases carried by livestock, principally by domestic sheep. In some cases reported in the literature, exposures to some of these diseases have resulted in the decimation of entire bighorn populations. The diseases are transmitted in numerous ways, including nose-to-nose contact and wet soils associated with areas of concentrated use, such as stock watering ponds. The BLM has adopted guidelines for domestic sheep grazing in or near bighorn sheep habitat to prevent the spread of disease.

Management of bighorn sheep is guided by three herd management plans and guidelines: The Utah BLM Statewide Desert Bighorn Sheep Management Plan (BLM 1986), Revised Guidelines for Domestic Sheep and Goat Management in Native Wild Sheep Habitats (BLM 1998a), and the Utah Bighorn Sheep Statewide Management Plan (UDWR 1999). Additional guidance is found in the Henry Mountains Desert Bighorn Sheep Habitat Management Plan (BLM 1990a).

3.3.9.3.4 Pronghorn

Five Wildlife Management Units contain pronghorn habitat within the planning area (San Rafael, Henry Mountains, Plateau, Monroe, and a portion of Mt. Dutton). Pronghorn prefer very open vegetative habitat types, such as salt desert shrub, grassland, and other treeless types. Typically, pronghorn avoid slopes greater than 20%. Pronghorn fawning occurs throughout the range of the species (Map 3-5). Pronghorn diets comprise a variety of forbs, shrubs, and grasses. Forbs are of particular importance during spring and summer, and shrubs are more important during the winter.

3.3.9.3.5 Mule Deer

Six mule deer Wildlife Management Units occur in the planning area. Mule deer are migratory, moving seasonally between summer and winter ranges (Map 3-6). Mule deer usually summer at high elevations and winter at low elevations. Their diets consist largely of sagebrush, primarily Wyoming sagebrush. Shrubs such as true mountain mahogany, fourwing saltbush, and antelope bitterbrush are important winter forage species. Mule deer fawn during the spring on their migration back to their summer range.

Mule deer have a high degree of fidelity to specific winter ranges, where high population densities concentrate on relatively small areas. Because of the relatively small winter range area, high population densities, and the natural stress of winter survival, mule deer are vulnerable to stress caused by human activity in winter range areas, such as antler hunting and other recreational activities. Mule deer are displaced an average of 600 feet from areas of human activity.

3.3.9.3.6 Elk

The planning area includes portions of four elk Wildlife Management Units: Plateau, Monroe, Beaver, and Mt. Dutton (Map 3-7). Elk are migratory, moving seasonally between summer and winter ranges. They summer at higher elevation ranges in aspen and forested habitats, where their diet consists primarily of grasses and forbs. Elk calve during late spring and early summer in aspen-mountain browse,

intermixed vegetation types. Elk winter at mid-to-lower elevation ranges, occupying the sagebrush and woodland habitat types and congregating in herds of 50 to 200 or more. Human activity in elk winter range adds additional stress to the natural stress of winter survival.

3.3.9.3.7 Black Bear

Black bear is currently the only bear species inhabiting Utah. Black bears are native to Utah and are fairly common. In the planning area, black bears are present in Wayne and Garfield counties, where they can be found primarily in large forested areas.

3.3.9.3.8 Cougar

Cougar, or mountain lions, are found statewide in Utah, occupying habitat types ranging from rugged desert areas to above timberline. The species is fairly common throughout Utah, but individuals are rarely seen because of their secretive nature. Seasonally, their movements follow their main prey: mule deer. Cougar will also feed on rabbits, elk, or other animals, but about 80% of their diet consists of deer. Cougars are active year-round, during day and night, although most activity occurs at dawn and dusk. They are hunted on a limited and closely monitored basis in Utah.

3.3.9.3.9 Furbearers

Several furbearer species are found in the planning area. Furbearers, as defined by UDWR, include bobcats, raccoons, badgers, weasels, red fox, and beavers. Red fox are found throughout the planning area, and numbers are relatively high. Bobcats are fairly common in Utah; however, because of their secretive nature they are rarely seen.

3.3.9.3.10 Upland Game Birds

The lands managed by the RFO provide important migration, nesting, and winter habitats for upland game birds. Upland species include greater sage grouse, blue grouse, pheasants, and quail. (Greater sage grouse are discussed in more detail in Section 3.3.8, Special Status Species.) Upland species feed frequently on upland grasses and forbs in grassy fields and meadows, where such vegetation is succulent and sufficiently open to enable rapid flight and avoidance of harboring predators. Such habitats support upland game birds year-round.

3.3.9.3.11 Other Non-game Species

Information on small mammals, bats, reptiles, and amphibians is lacking. Databases maintained by the Utah Natural Heritage Program document general occurrences and potential for many of these groups of wildlife, but site-specific inventories have not been conducted for most of the RFO. However, as inventories are conducted, new occurrences and range extensions are being discovered, which emphasizes the need for more comprehensive work.

3.3.9.4 Migratory Birds

Migratory birds have been protected by treaty (with Great Britain) since 1916 and by law under the Migratory Bird Treaty Act since 1918. In Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds signed by President Clinton in 2001, Federal agencies were directed to "design migratory bird habitat and population conservation principles, measures, and practices into agency plans and planning processes..." Bird Habitat Conservation Areas (BHCAs) were identified in an effort to focus cooperative migratory bird habitat enhancement or restoration efforts in these important areas. The

BHCAs are not special designations and do not require additional regulation. In the "Coordinated Implementation Plan for Bird Conservation in Utah," (IWJV 2005) three BHCAs were identified on lands managed by the RFO:

- **BHCA 30:** Sevier Bridge/Chicken Creek Reservoirs, open water with large marsh areas
- **BHCA 43:** Parker Mountain, sagebrush-steppe habitat
- **BHCA 51:** Henry Mountains (north of Mount Ellen), mountain riparian habitat

Neotropical migratory birds are found in all habitats within the planning area (Parrish *et al.* 2002). Neotropical migrants are defined as land birds that fall into four categories of species breeding in North America (north of Mexico) and then migrating to and from the tropics (Martin and Finch 1995). These birds include a diverse array of species, such as hummingbirds, finches, flycatchers, warblers, thrushes, and orioles. Most of these birds are summer residents that use habitats ranging from lower elevation wetlands to high-elevation forests for breeding and raising young. Some species, such as the American robin and mallard, are migratory, but small populations may be present yearlong depending on seasonal conditions. Winter residents, such as rough-legged hawk, snow buntings, and rosy-crowned gray finches, arrive from arctic breeding grounds or high-elevation, alpine areas to use winter habitats in lower elevation foothills and major river valleys, seasonally replacing summer residents.

3.3.9.5 Raptors

Raptor management on public lands in Utah is guided by the use of best management practices (BMPs) (Appendix 10), which are BLM-specific recommendations for implementation of the USFWS, Utah Field Office's *Guidelines for Raptor Protection from Human and Land Use Disturbances*. The guidelines were originally developed by USFWS in 1999 and were updated during 2002 to reflect changes brought about by court decisions, policy changes, and new Executive Orders. The guidelines were provided in an attempt to ensure project compatibility with the biological requirements of raptors and to encourage an ecosystem approach to raptor management.

Raptors have very specific requirements for nesting territories, including vegetation structure and diversity. Requirements for physiographic features (e.g., elevation, slope), as well as prey availability, vary by species. Raptors typically reuse the same nesting territory for years, and alterations to these areas could reduce the viability of raptor populations. Threats to raptors include loss of habitat, reduction in food supply, and disturbance during nesting. Habitat loss from changing land use to industrial, agricultural, or recreational could reduce available food supply or alter nesting territories. Each raptor nest, its offspring, and supporting habitat are considered important to the long-term viability of raptor populations. Changes in vegetation structure and diversity could reduce the areas meeting nest site requirements.

Generally courtship, nest construction, incubation, and early brooding are considered higher-risk periods during which adults are easily prone to temporarily or permanently abandon nests in response to disturbance. This may result in abandonment of eggs or young. Loss or alteration of habitat for any raptor species can also result in a loss of or change in the raptor prey base or historical nesting territories (USFWS 2002e).

3.3.10 Wild Horses and Burros

The goal of the Wild and Free-Roaming Horse and Burro Act is to manage wild horses and burros, "in the area where presently [1971] found as an integral part of the natural system of the public lands." The Act and subsequent regulations direct that wild horses and burros be managed to ensure a thriving natural

ecological balance with the minimum feasible management required to maintain the populations. The management of wild horse and burro populations to maintain a sufficient size to be genetically viable is important aspect of this goal. Some management decisions could impact the viability of wild horse or burro populations. Populations that would require long-term intensive management would not comply with the minimum feasible management regulations and would therefore be noted as an impact. Following passage of the Wild, Free-Roaming Horse and Burro Act of 1971, BLM identified two wild horse and burro management areas in the planning area: the Robbers Roost Herd Management Area (HMA) for wild horses and the Canyonlands HMA for wild burros.

3.3.10.1 Robbers Roost Herd Management Area

The Robbers Roost HMA straddles the Wayne-Emery county line. Vegetation in the area is largely desert grassland, with desert shrub interspersed throughout. As is common throughout the area, the lack of water limits the habitat available for horses. With an appropriate management level of 15 to 25 horses, maintaining a viable population requires management intervention. In 2003 it was estimated that there were about 17 horses in the HMA.

A 1975 agreement between the Moab and Richfield district managers directed the Moab District to administer the Robbers Roost HMA. This agreement was updated in 1995, again directing that the Moab District, now part of the Price Field Office, manage the wild horses within the HMA. Thus, the management of and planning for the Robbers Roost HMA is the responsibility of the Price Field Office and is consequently not addressed in this DRMP/DEIS.

3.3.10.2 Canyonlands Herd Management Area

The Canyonlands HMA is more than 89,000 acres, including several State of Utah parcels. It is located in eastern Wayne County, adjacent to Glen Canyon National Recreation Area on the east and the Horseshoe Canyon unit of Canyonlands National Park on the west. The HMA overlaps portions of the French Spring/Happy Canyon Wilderness Study Area (WSA), Horseshoe Canyon South WSA, Horseshoe Canyon North WSA, and Dirty Devil WSA. Vegetation in the area is a mix of desert grasses and desert shrub, although areas with deeper soils support sagebrush and juniper.

Existing planning allocates forage for less than 20 burros. However, a recent grazing use adjustment on a portion of a grazing permit and preference has resulted in additional forage for burros and has eliminated most competition with livestock for habitat resources such as forage and water on the HMA. Current herd management includes regular inventories to monitor burro numbers. The most recent inventory of the Canyonlands HMA identified nearly 60 burros. The isolated and remote location of this burro HMA makes extensive management intervention and monitoring difficult.

The burros of the Canyonlands HMA are unique in that pinto coloration, usually rare in wild burros, predominates. The remote nature of the Canyonlands HMA, coupled with the rough terrain, limit opportunities for the public to view these unique animals.

3.3.11 Fire and Fuels Management

Fire is a natural phenomenon. Vegetation communities in the planning area have adapted to the presence or absence of wildland fire over several thousand years. Geographic, topographic, elevational, and climatic variances throughout the planning area have provided an array of conditions in which fire has historically (from 200 to 400 years ago) affected vegetation differently. Consequently forests, woodlands, and rangelands throughout the planning area have adapted to fire. In addition to natural fire regimes, many vegetation communities were affected by American Indian use of fire to manipulate the

environment (Williams 2003). Therefore, the role of anthropogenic (human caused) fires cannot be separated from the role of natural fires for the last 10,000-plus years.

Research has shown that many of the forest, woodland, and rangeland ecosystems in the planning area are not functioning properly. Vegetation communities are considered as functioning properly when they can withstand and/or recover from fire naturally. Appendix 6 contains detailed information concerning the fire ecology of each major vegetation cover type potentially affected by the decisions made in this environmental impact statement. The historic fire-return intervals are identified, as are the responses to fire disturbance of each cover type. Appendix 6 also contains information about the general condition cover type and departure from historic conditions.

3.3.11.1 Wildland Fire Occurrence

Studies of fire-scarred trees in the Henry Mountains and national forest lands within the planning area indicate that before European settlement, fires burned the areas in a relatively consistent pattern. Tree rings from ponderosa pines in a predominantly Douglas-fir stand indicated that the area burned an average of every 19 years (Bartos and Campbell 1998). Note that this does not indicate that the entire planning area burned this regularly. However, areas of similar vegetation types would have been adapted to similar fire intervals.

Yearly fire occurrence data for the RFO is available from 1979 to 2003. (Note: Earlier data is for the old Richfield District, which encompassed what is now both the Richfield and Fillmore Field Offices.) Figure 3-1 lists the yearly number of fires and acres burned over this time. As displayed in Figure 3-2, most fires (81%) in the RFO occur from June through August. Figure 3-3 displays the size distribution of the 300 fires since 1979. Figure 3-4 illustrates the distribution of the 300 fires by cause. Seventy-six percent of the fires in the RFO were ignited by lightning.

Figure 3-1. Richfield Planning Area Fires and Acreages (1979–2003)

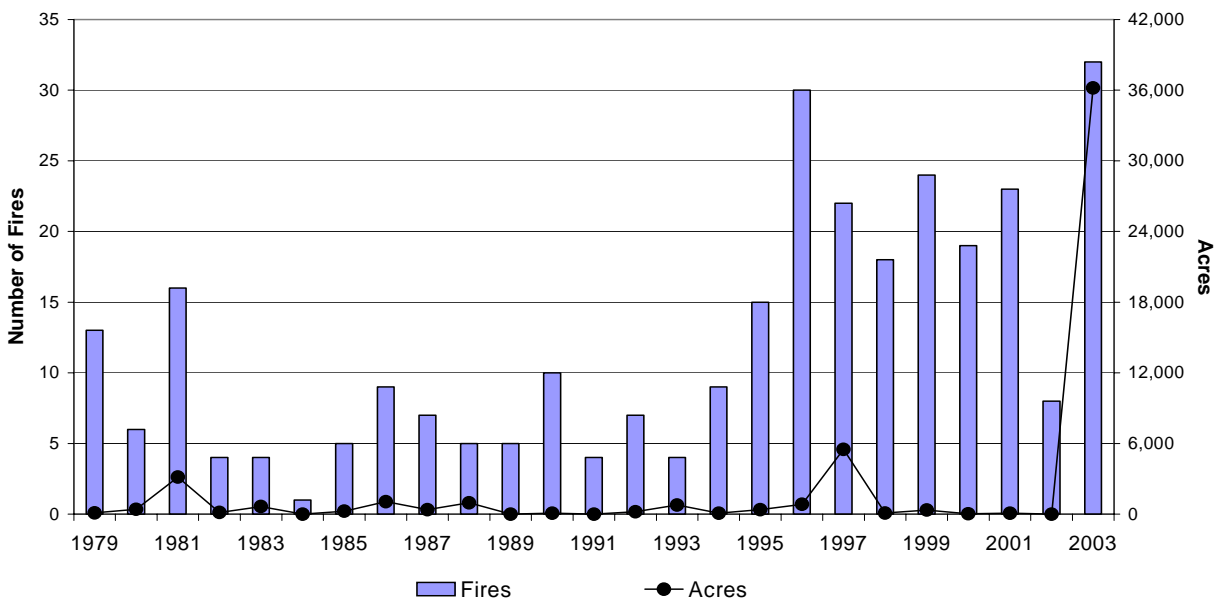


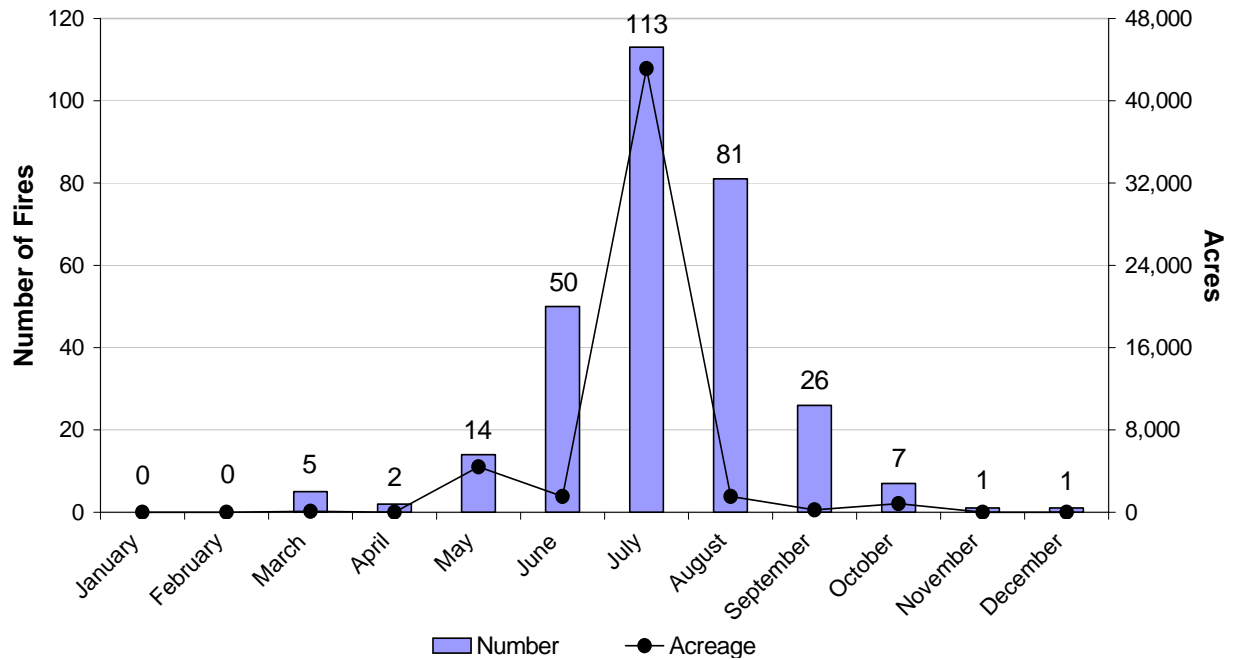
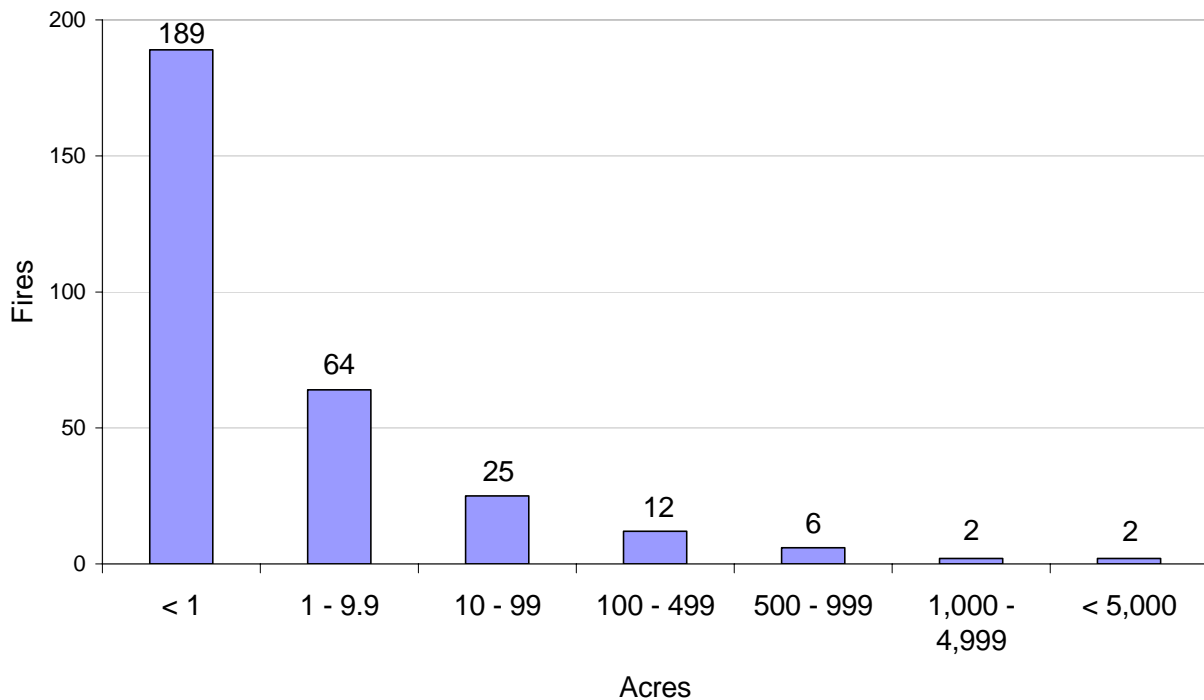
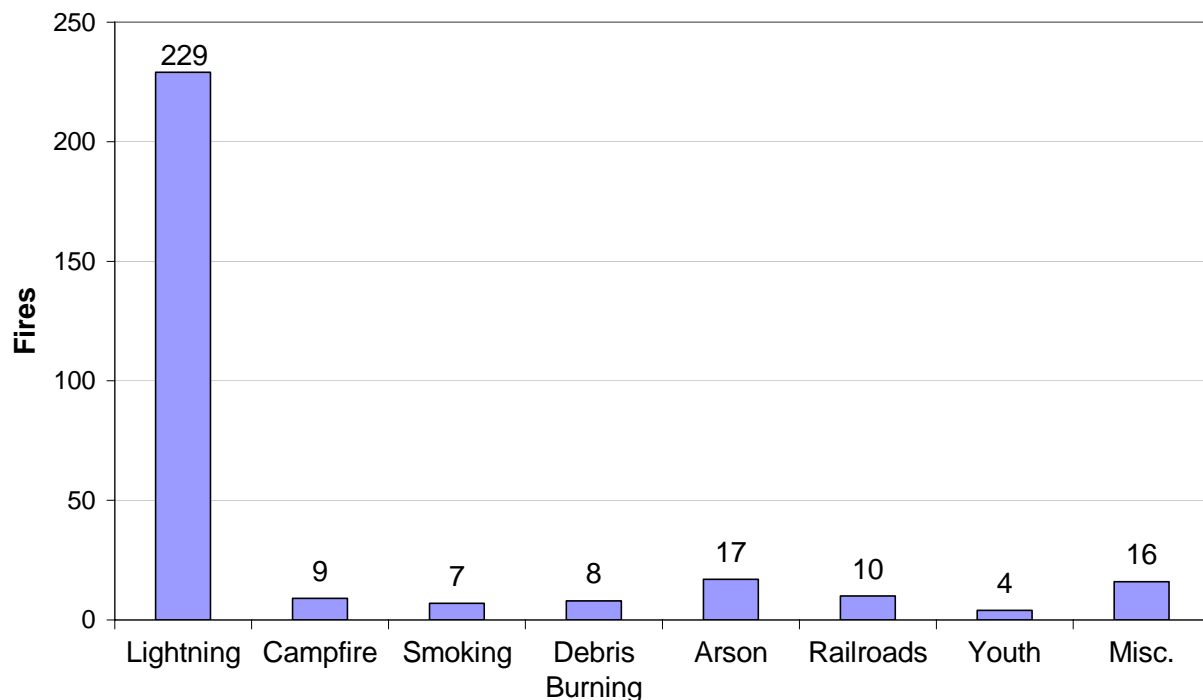
Figure 3-2. Richfield Field Office Fire Occurrence by Month (1979–2003)**Figure 3-3. Richfield Field Office Fires by Size (1979–2003)**

Figure 3-4. Richfield Field Office Fire Causes (1979–2003)

3.3.11.2 Hazardous Fuels Reductions

Many areas in the lands managed by the RFO have changed from historic disturbance regimes. Aspen forest types, which reproduce through suckering rootstock, need disturbance or dieback to stimulate regeneration (O'Brien and Waters 1998). In the absence of disturbance, areas once dominated by aspen have been converted to conifers or sagebrush (Bartos and Campbell 1998). Areas with small amounts of aspen in a stand may indicate that the area was once dominated by aspen (Bartos and Campbell 1998). "An approximately 60% decline in aspen dominated landscapes has occurred on National Forest System lands across Utah" (Bartos and Campbell 1998, pp.23). Aspen in the planning area, either adjacent to USFS land or in the Henry Mountains, is intermingled with and adjacent to stands of mixed conifer stands. Conditions noted throughout Utah are not expected to be different from those in the planning area.

The exclusion of frequent, low-intensity fires in Ponderosa pine stands has resulted in a buildup of understory fuels in these stands. This change threatens the pine stands, which are resistant to low-intensity fire but susceptible to larger crown fires. Understory fuels act as ladders, allowing fire to jump to the trees' crown, replacing ponderosa pine stands.

Using Forest Inventory and Analysis data collected on public lands administered by the RFO, the Rocky Mountain Research Station identified that more than 67% of plots had a stand age less than 150 years. These stands form a closed-canopy "belt" between lower valley shrub lands and higher mountain forests. Reduction of fine fuels and decreases in fire return intervals has resulted in pinyon-juniper encroachment, leading to large acreages of closed canopy pinyon-juniper in formerly treeless areas (USFS 2000). As a result, structural stages are strongly weighted to stands much denser than typical conditions.

Stands are considered as functioning properly when they can withstand and/or recover from disturbance. Many vegetation communities, specifically those described above, are not considered in PFC. For further discussion on fire ecology of the various vegetation types, refer to Appendix 6. Table 3-17 identifies existing vegetation acreages and their estimated departure from historic (200–400 years before the present) acreages. It is estimated that American Indian-initiated wildland fires comprised approximately 40% of historic wildland fires (Williams 2003). Therefore, allowing wildland fires at natural levels would not include human intervention at historic levels.

The increasing size, intensity, and severity of wildland fires pose greater threats to human life and property. More people are recreating on and adjacent to public lands and building homes in wildland areas, increasing their exposure to naturally ignited wildland fires and increasing the risk of human-caused wildland fire ignitions. Additionally, the threat to other resource values from uncharacteristically intense and severe wildland fires has increased, resulting from uncharacteristic changes in vegetation, fuel loadings, and fire behavior. Consequently, fire suppression costs have also increased.

Table 3-17. Vegetation Departure from Historic Acreages

Class Name	Historic Acreages	Percentage of Total	Existing Acreages	Percentage of Total
Other Non-Vegetation	67,858	3.2%	67,858	3.2%
Mixed Conifer ³	17,022	0.8%	29,317	1.4%
Aspen	20,251 ¹	1.0%	5,786	0.3%
Ponderosa Pine	44,463	2.1%	42,785	2.0%
Oak	26,330	1.2%	19,629	0.9%
Mountain Shrub	24,781	1.2%	16,378	0.8%
Pinyon-Juniper	216,036 ²	10.2%	551,674	25.9%
Sagebrush Steppe	660,468	31.0%	343,781	16.2%
Desert Grassland	324,652	15.3%	324,652	15.3%
Desert Brush	726,085	34.1%	726,085	34.1%
Total	2,127,946		2,127,945	

Notes—

1) Desired aspen figure created by dividing existing acreage by 0.4, basing this figure on Campbell and Bartos (1998) conclusion that aspen in Utah has undergone a 60% reduction in coverage.

2) Using Forest Inventory and Analysis data collected and determined from public lands within the planning area, approximately 67.6% of the pinyon-juniper woodland type in the RFO is 150 years old or younger. It is assumed that 90% of that 67.6% is not in PFC and requires treatment within the next 100 years. The trees older than 150 years, and 10% of those younger than 150 years, are assumed to be stable stands that are not adapted to the 10–30 year fire interval (e.g., those located on dry, rocky ridges, very xeric soils)

3) The highest elevations of the spruce/fir type have very long fire return intervals, and these ecosystems have not been adversely affected by fire exclusion.

Sources: Fishlake National Forest Prescribed Natural Fire Plan (1998); USFS, 2000; USFS, 2004

3.3.11.3 Fuels Treatments

Over the last 20 years, development in the wildland-urban interface (WUI) has compounded the problem of fuels accumulation through the construction of homes and businesses. The resulting risk of exposure to high-intensity fires that could threaten safety and property has increased. Declining vegetation conditions and increased construction have required a more active hazardous fuel treatment program to reduce the number and severity of wildland fires.

Before implementation of the 1995 Federal Wildland Fire Management Policy, fewer than 1,000 acres of vegetation per year were treated in the RFO. This acreage included prescribed fire and other means of treating fuels. Since 1995, hazardous fuel reduction efforts within the RFO have treated roughly 4,000 acres per year. The focus of most of these treatments has been on reducing hazardous fuels in WUI areas, although treatments were also implemented to improve ecosystem health, improve rangeland production, and enhance wildlife habitat.

3.3.11.4 Fire Regimes and Condition Classes

Fire regimes address the nature of disturbance by fire by describing its historic intensity, frequency, and effect on vegetation. Knowledge of fire regimes is a critical component in managing landscapes and analyzing changes in fire frequencies and intensities. Table 3-18 lists the natural fire regimes by which vegetation is classified in the RFO. Categorization of vegetation types by fire regimes was based on information which is provided in Appendix 6.

Table 3-18. Fire Regime Classifications & RFO Estimated Acreage

Regime	Fire Frequency	Fire Intensity	Estimated Acres in RFO	Percent of Total
Fire Regime I	0–35 years	Low Severity	43,600	2.1%
Fire Regime II	0–35 years	Stand Replacing	903,000	44.0%
Fire Regime III	35–100 years	Mixed Severity	34,700	1.7%
Fire Regime IV	35–100 years	Stand Replacing	1,070,600	52.2%
Fire Regime V	More than 200 years	Stand Replacing or Mixed Severity	300	<0.1%

Source: USC 2003; USFS 2001; USGS 2004.

As they relate to fire, vegetation conditions are evaluated by the degree of departure from fire regimes that a specific vegetation community demonstrates. Departure from fire regimes is indicated by changes to key ecosystem components (e.g., species composition, structural stage, stand age, canopy closure, and fuel loadings). The degree of departure is ranked using three condition classes that categorize vegetation communities by evaluating the difference between their historic fire regime and related indicating characteristics, and their current condition and its indicating characteristics. Simply put, fire regime “condition classes are a qualitative measure describing the degree of departure from historical fire regimes” (Schmidt K.M. *et al.* 2002). Table 3-19 illustrates the estimated acreage of vegetation in the RFO in each condition class.

Table 3-19. Fire Regime Condition Class Description and RFO Estimated Acreage

Condition Class	Description	Estimated Acres in RFO	Percent of Total
1	Fire regimes are within a historical range, and the risk of losing key ecosystem components is low. Vegetation attributes (species composition and structure) are intact and functioning within a historical range.	2,300	<1%
2	Fire regimes have been moderately altered from their historical ranges. The risk of losing key ecosystem components from fire is moderate. Fire frequencies have departed from historical frequencies by one or more return intervals (either increased or decreased), resulting in moderate changes to the size, intensity, or severity of fires or to landscape patterns. Vegetation attributes have been moderately altered from their historical range of attributes.	281,000	14%

Condition Class	Description	Estimated Acres in RFO	Percent of Total
3	Fire regimes have been significantly altered from their historical ranges. The risk of losing key ecosystem components from fire is high. Fire frequencies have departed from historical frequencies by multiple return intervals, resulting in dramatic changes to the size, frequency, intensity, or severity of fires or landscape patterns. Vegetation attributes have been significantly altered from their historical range of attributes.	1,768,900	86%

Sources: Schmidt K.M. *et al.* 2002; USC 2003; USGS 2004.

Areas in Condition Classes 2 and 3 are of most concern because they often need management intervention before allowing fire to return naturally. Acreage of vegetation in Condition Class 3 is high because much of the RFO has converted to pinyon-juniper and sagebrush vegetation types.

3.3.12 Non-WSA Lands with Wilderness Characteristics

Since Wilderness Study Areas (WSAs) were established in the 1980s, designation of wilderness in Utah has become a prominent state and national issue. For more than 20 years, the public has debated which lands have wilderness characteristics and should be considered by Congress for wilderness designation. As a result of the debate (and a significant passage of time since BLM's original inventories), in 1996 the Secretary of the Interior directed the BLM to take another look at some of the lands in question. In response to this direction, the BLM inventoried these lands and found approximately 2.6 million acres of public land statewide (outside of existing WSAs) to have wilderness characteristics (BLM 1999).

In September 2005, the BLM and the State of Utah, the Utah School and Institutional Trust Land Administration (SITLA), and the Utah Association of Counties (collectively "Utah") reached an agreement negotiated to settle a lawsuit originally brought in 1996 by the State of Utah, which challenged the BLM's authority to conduct new wilderness inventories. The settlement stipulated that the BLM's authority to designate new WSAs expired no later than October 21, 1993. Pursuant to the Federal Land Policy and Management Act of 1976 (FLPMA), 43 USC § 1712(c), the BLM, however, does have the authority to conduct inventories for characteristics associated with the concept of wilderness and to consider management of these values in its land use planning process. The BLM's Land Use Planning Handbook (H-1601-1) states that decisions on whether or not to protect wilderness characteristics are to be considered during planning. This section addresses lands outside existing WSAs that have been identified as having wilderness characteristics.

Non-WSA lands with wilderness characteristics are those that have the appearance of naturalness and outstanding opportunities for solitude or primitive and unconfined recreation, and comprise an area of 5,000 acres or more. In evaluating areas for wilderness characteristics, the RFO took into consideration the language of the 1964 Wilderness Act, and concluded that a size criterion is an important indicator of whether or not outstanding opportunities for solitude or primitive and unconfined recreation exist. Areas of less than 5,000 acres are generally not large enough to provide for these opportunities. Also, because the size criterion had been used for all previous wilderness inventories, applying it here allowed for consistency in both application and finding of wilderness characteristics. The size criterion of 5,000 acres was applied only to "stand-alone" units; that is, units not contiguous with other Federal lands previously determined to possess wilderness characteristics (e.g., WSAs and National Park Service and U.S. Forest Service lands that are administratively endorsed for wilderness). Units that are contiguous with Federal lands with wilderness characteristics were evaluated for naturalness alone. Opportunities for solitude and primitive recreation were assumed to be present in association with the larger contiguous area.

Detailed information about non-WSA lands with wilderness characteristics is part of the administrative record for this RMP/EIS. The following records are available for public review at the RFO: 1) 1999 Utah Wilderness Inventory; 2) 1999 Utah Wilderness Inventory Revision Document for the Richfield Field Office (December 2002); 3) 1999 Utah Wilderness Case Files for the RFO; 4) Reasonable Probability Determinations for the RFO, and 5) Documentation of Wilderness Characteristics Review for the RFO.

Non-WSA lands with wilderness characteristics that were inventoried by BLM in the 1999 Utah Wilderness Inventory included approximately 511,200 acres in 20 wilderness inventory areas (WIAs). Based on subsequent public comments and after conducting additional field checks, the BLM revised the inventory in December 2002. The revised inventory identified a total of 551,770 acres in 20 WIAs within the RFO possessing wilderness characteristics. The inventory and the inventory revision also identified areas in portions of WIAs that did not have wilderness characteristics.

In addition to the lands that were inventoried in the 1999 Utah Wilderness Inventory and its revision, additional lands in the RFO have been reviewed for wilderness characteristics by BLM. These lands are currently proposed for wilderness as part of S.1179, America's Red Rock Wilderness Act of 2007, and are neither WSAs nor WIAs. (Note: The Act has been introduced in Congressional Term 110 as S.1170). The wilderness characteristics review process involved use of a BLM interdisciplinary team that reviewed available information and followed-up with field trips, where necessary. The BLM interdisciplinary team evaluated information provided by the public about these areas, their on-the-ground knowledge of these areas, information in case files and field files, master title plats, aerial photos, GIS data layers, and field inspections, and determined that all or parts of these areas have wilderness characteristics. When completed, the interdisciplinary team reviewed about another 200,000 acres, of which 130,830 acres were found to have wilderness characteristics.

In summary, since the beginning of the 1999 Utah wilderness inventory process, the BLM evaluated 31 areas totaling 848,500 acres for their wilderness characteristics in the RFO. Of these, the BLM determined that 29 areas totaling 682,600 acres met the criteria for wilderness characteristics of size, naturalness, and outstanding opportunities for solitude or primitive recreation (See Table 3-20 and Map 3-9). These lands, non-WSA lands with wilderness characteristics, have been carried through this land use planning process to determine how their wilderness characteristics will be managed. Many of the inventoried lands were found to lack wilderness characteristics, and are also summarized in the table below. Wilderness characteristic areas generally fall into one (or two) of three broad categories:

- Areas contiguous to BLM WSAs;
- Areas adjacent to National Park Service lands administratively endorsed for wilderness designation; or
- Areas (generally over 5,000 acres) that stand alone as separate units.

Table 3-20. Non-WSA lands with Wilderness Characteristics Evaluation

#	Area Evaluated	County	Acres evaluated	Acres found to possess wilderness characteristics	Comments
1	Bull Mountain	Garfield	4,800	3,800	Contiguous to Bull Mountain WSA.
2	Bullfrog Creek	Garfield	42,600	33,700	
3	Cane Spring Desert	Garfield	18,300	0	
4	Dirty Devil/French Spring	Garfield Wayne	149,500	133,100	Contiguous to Dirty Devil and French Spring WSAs. Includes Dirty Devil eligible wild and scenic river segment.

#	Area Evaluated	County	Acres evaluated	Acres found to possess wilderness characteristics	Comments
5	Dogwater Creek	Garfield	3,500	3,500	Contiguous to Capitol Reef National Park (NP) lands that are administratively endorsed for wilderness designation.
6	Fiddler Butte	Garfield	22,000	19,700	Contiguous to Fiddler Butte WSA.
7	Flat Tops	Wayne	23,000	23,000	Adjacent to non-WSA lands with wilderness characteristics in the Price Field Office (Emery County)
8	Fremont Gorge	Wayne	20,100	16,000	Contiguous to Fremont Gorge WSA and Capitol Reef NP lands that are administratively endorsed for wilderness designation. Includes Fremont Gorge eligible wild and scenic river segment
9	Horseshoe Canyon South	Wayne	20,600	20,600	Contiguous to South Horseshoe Canyon WSA and Glen Canyon NRA lands that are administratively endorsed for wilderness designation
10	Jones Bench	Sevier	3,300	3,300	Contiguous to Capitol Reef NP lands that are administratively endorsed for wilderness designation
11	Kingston Ridge	Piute	10,200	10,200	
12	Labyrinth Canyon	Wayne	27,100	12,300	Adjoins North Horseshoe Canyon WSA and Glen Canyon NRA lands that are administratively endorsed for wilderness designation
13	Limestone Cliffs	Sevier	24,900	24,800	
14	Little Rockies	Garfield	23,300	23,200	Within Little Rockies National Natural Landmark, contiguous to Little Rockies WSA and Glen Canyon NRA lands that are administratively endorsed for wilderness designation.
15	Long Canyon	Garfield	16,600	16,600	Contiguous to Capitol Reef NP lands that are administratively endorsed for wilderness designation.
16	Mount Ellen—Blue Hills	Garfield Wayne	66,900	49,800	Contiguous to Mount Ellen/Blue Hills WSA
17	Mount Hillers	Garfield	2,300	1,800	Contiguous to Mount Hillers WSA.
18	Mount Pennell	Garfield	77,000	65,600	Contiguous to Mount Pennell WSA
19	Muddy Creek/Crack Canyon	Wayne	65,600	61,800	
20	Mussentuchit Badlands	Sevier	700	700	Adjacent to non-WSA lands with wilderness characteristics in the Price Field Office (Emery County)
21	Notom Bench	Wayne	8,700	8,000	Contiguous to Capitol Reef NP lands that are administratively endorsed for wilderness designation
22	Phonolite Hill	Piute	7,900	7,900	
23	Pole Canyon/Hunter Spring	Garfield	6,000	6,000	
24	Ragged Mountain	Garfield	30,100	25,900	

#	Area Evaluated	County	Acres evaluated	Acres found to possess wilderness characteristics	Comments
25	Red Desert	Wayne	40,900	40,700	Contiguous to Capitol Reef NP lands that are administratively endorsed for wilderness designation.
26	Robbers Roost Flats	Wayne	7,700	0	
27	Rock Canyon	Sevier	1,300	1,300	Adjacent to non-WSA lands with wilderness characteristics in the Price Field Office (Emery County)
28	Rocky Ford	Piute	6,700	6,700	
29	Sweetwater Reef	Wayne	6,200	6,200	Adjacent to non-WSA lands with wilderness characteristics in the Price Field Office (Emery County)
30	Wild Horse Mesa	Wayne	88,300	49,700	
31	Wildcat Knolls	Sevier	22,400	6,700	Adjacent to non-WSA lands with wilderness characteristics in the Price Field Office (Emery County)
	Total		848,500	682,600	
NPS = National Park Service, including Canyonlands and Capitol Reef National Parks and Glen Canyon National Recreation Area WSA = Wilderness Study Area					

3.4 RESOURCE USES

3.4.1 Forestry and Woodland Products

3.4.1.1 Forest and Woodland Types and Products

Forested and woodland areas within the RFO range from oak and pinyon-juniper stands to aspen, ponderosa pine, Douglas fir, white fir, Englemann spruce, and limber pine. Generally, lower elevations (6,000 feet to 8,400 feet) are dominated by woodland species, such as juniper. Middle elevations (7,000 feet to 7,500 feet) are a mix of pinyon-juniper, whereas in higher elevations (7,500 feet to 8,000 feet) pinyon and oak brush dominate with the occasional juniper. Pinyon-juniper stands compose the largest forest cover type within the RFO (see Section 3.3.4 - Vegetation).

As elevation increases, timber species dominate the cover type. Between 8,000 feet and 9,600 feet, ponderosa pine and aspen are the major species, whereas Douglas fir, white fir, subalpine fir, Englemann spruce, aspen, and limber pine are found at elevations above 9,600 feet. Generally, timber species are located on north and northwest facing slopes or in canyon bottoms where there is enough soil moisture to sustain timber. The largest concentrations of timber cover types are found in the Henry Mountains and along the border between BLM and USFS-administered lands (Map 3-3).

Pinyon-juniper woodlands cover 552,000 acres, about one-quarter of the RFO. In contrast, true forests—including ponderosa pine, mixed-conifer, and aspen—represent only 5% of the RFO and are located primarily in the Henry Mountains. Forests and woodlands within the RFO are of limited commercial

value because of their low productivity and distance from markets. By and large, the aesthetic and ecological importance of forests far outweighs their limited economic value.

3.4.1.1.1 Pinyon-Juniper Woodlands

Pinyon-juniper woodlands are increasing in size and density over a large portion of the RFO. This increase is attributed to the absence of wildland fire for the last century and long-term pinyon-juniper management. Where pinyon-juniper canopy cover is dense with large trees, very few, if any, desirable forage species are present. Plant species diversity is decreasing because of the increasing tree canopy cover.

The boundaries of the pinyon-juniper woodlands are also increasing. Pinyon-juniper woodlands are invading sagebrush areas and are outcompeting desirable forage species. Shrubs and herbaceous plants reduce erosion better than pinyon-juniper trees. Increasing pinyon-juniper density adversely affects watershed health. Areas with steep slopes and erodible soils in pinyon-juniper tree cover are vulnerable to serious soil erosion. Pinyon-juniper woodlands do not burn in normal precipitation years but during years of drought, the buildup of continuous fuels is a fire hazard. Because they have expanded into areas formerly occupied by other vegetation types, management attention has focused on reducing, rather than the sustaining, these woodlands.

Pinyon pine provides utilitarian value in the form of firewood, Christmas trees, and pine nuts. Juniper is used for fence posts and firewood. Both are unsuitable for lumber because of their small size, irregular shape, and lack of self-pruning lower limbs. Approximately 600 cords of firewood (both commercial and non-commercial) and 150 Christmas trees are harvested from the RFO per year.

3.4.1.1.2 Ponderosa Pine

Ponderosa pine forests cover 43,000 acres, or about 2% of the RFO. In the inland west and southwest, ponderosa pine is a commercially valuable and productive timber tree. Currently, this species is less important economically in the planning area, but there have been limited sales of ponderosa pine in the past. Permits for ponderosa pine harvesting are limited to a few trees each and occur primarily for fire salvaged trees. Requests are evaluated on a case-by-case basis.

3.4.1.1.3 Mixed-Conifer

Less than 2% of the RFO (29,000 acres) is forested by mixed-conifer stands, which include Engelmann spruce, white fir, subalpine fir, Douglas fir, and several pine species. Although commercially important elsewhere, these forests are of limited economic value within the RFO. Requests for harvesting of mixed conifer species are evaluated on a case-by-case basis, with no known recent sales.

3.4.1.1.4 Aspen

Quaking aspen forests cover 12,000 acres, less than 1% of the RFO. Because it is easy to cut, aspen is sometimes used for firewood. It has no commercial value within the RFO. No recent permits have been issued for aspen. Requests are evaluated on a case-by-case basis.

3.4.1.2 Current Level of Forest and Woodland Activity

In 2001, RFO and Henry Mountain Field Station issued 647 permits for forest products; 268 of these permits were for the collecting of seeds from wildland sources. In 2002, the two offices issued 456 permits for forest products, with 109 of them being for the collection of seeds from wildland sources.

Because of the serious drought and the decrease in seed production in 2002, the RFO did not issue as many seed permits in 2002, and did not issue any seed permits at all in the fall/winter of 2002/2003.

3.4.1.3 Forest and Woodland Health

The RFO has many areas of diseased or insect killed trees in the pinyon-juniper woodlands. This is generally limited to single trees, but some small patches, usually less than an acre, are scattered throughout the area. During the prolonged drought of the late 1990s and early 2000s, areas of pinyon-juniper woodlands died. Forests in the Henry Mountains also suffered from disease and insect infestations. In 2003 a large number of pinyon and juniper trees died on the north end of the Henry Mountains and in other areas. Portions of Mount Ellen, Mount Pennell, and Mount Hillers burned during 2003.

In 2001 and 2002, in accordance with the National Fire Plan, the RFO and the Interagency Fire Management organization began a cooperative effort to reduce fuels and restore forest and woodland health on a much larger scale. In 2002, mechanical methods were used to reduce fuels and restore woodland health on 4,061 acres within the RFO.

3.4.2 Livestock Grazing

Passage of the Taylor Grazing Act in 1934 initiated the Federal effort to regulate livestock grazing on public lands to provide for the orderly use, improvement, and development of the range. The Act established a system for allotting grazing privileges to livestock operators based on grazing capacities and priorities of use, and for the delineation of allotment boundaries. It also established standards for rangeland improvements and implemented grazing fees. The Act placed 142 million acres of land in western states under the jurisdiction of the Grazing Service, which evolved into the BLM in 1946. FLPMA and the Public Rangelands Improvement Act (PRIA) of 1978 provided additional authority for the management of livestock grazing on public land.

3.4.2.1 Grazing Authorization

Within the RFO, the BLM manages livestock grazing on public lands in Sanpete, Sevier, Wayne, and Piute counties; portions of Garfield County; and some allotments within Glen Canyon National Recreation Area and Capitol Reef National Park. Livestock grazing on public land is administered through livestock grazing allotments, shown on Map 2-7. Through an inter-district agreement, the Price Field Office manages several allotments within the RFO, and the RFO manages several allotments within the Price Field Office. There are 194 allotments in the RFO that were used by 143 livestock operators in 2002. The total forage available for livestock use in the RFO is 109,951 animal unit months (AUMs). The total number of AUMs authorized for the past 15 years is shown in Table 3-21. Grazing permits are usually issued for 10 years. Active use varies from the permitted use in the table as a result of fluctuations in forage availability and decisions of livestock operators to use or not use the public range in a given year. Appendix 7 (Table A7-1) provides detailed information on existing grazing allotments in the RFO.

Table 3-21. Comparison of Total Permitted Use to Active Use

Year	Active Use			Permitted Use
	Cattle	Sheep	Total	
1988	40,467	9,426	49,893	109,951
1989	35,337	8,282	43,619	109,951
1990	30,202	7,793	37,995	109,951

Year	Active Use			Permitted Use
	Cattle	Sheep	Total	
1991	35,837	6,423	42,260	109,951
1992	39,783	7,478	47,261	109,951
1993	42,768	9,393	52,161	109,951
1994	43,338	8,913	52,251	109,951
1995	47,532	11,514	59,046	109,951
1996	48,996	8,788	57,784	109,951
1997	48,894	10,051	58,945	109,951
1998	59,930	9,664	69,594	109,951
1999	62,295	10,062	72,357	109,951
2000	50,246	9,160	59,406	109,951
2001	63,743	12,848	76,591	109,951
2002	52,287	7,647	59,934	109,951
2003	31,011	8,910	39,921	109,951
Average	45,792	9,147	54,939	109,951

Source: RFO Grazing Files.

3.4.2.2 Allotment Categorization and Management

Allotments in the RFO have been categorized into three selective management categories. These categories were developed in 1981 to prioritize grazing allotments to achieve cost-effective improvement of rangeland condition and production. This selective management process emphasized those allotments with the most need and the best potential for return from the investment of public funds. Most allotments have been placed into one of the three categories according to management needs, resource conflicts, potential for improvement, and funding and/or staffing constraints. The three management categories are: Improve, Maintain, and Custodial.

Improve category allotments are managed to improve current resource conditions on allotments with resource issues and which have a high potential for return on investment. They receive the highest priority for funding and management actions. Maintain category allotments are managed to maintain current satisfactory resource conditions. They are actively managed to ensure that resource values do not decline. Custodial category allotments are under custodial management by the BLM to protect resource conditions and values. As watersheds are evaluated, the allotment category is reviewed. The RFO has 91 Improve category allotments covering 1,657,475 acres, 25 Maintain category allotments covering 589,884 acres, and 25 Custodial category allotments covering 80,339 acres. Ten allotments have not been categorized because they were unallotted at the time the allotment categorization process was implemented. Information specific to each of the 184 allotments in the RFO is provided in Appendix 7.

3.4.2.3 Rangeland Improvement Projects

The BLM and its cooperators have completed structural and nonstructural projects on public lands to improve and manage rangelands since 1943. The nonstructural projects include seeding, plowing, chiseling, contour furrowing, and herbicide spraying. The structural projects have included wells, pipelines, troughs, fences, guzzlers, reservoirs, and cattle guards.

Non-native seeding has occurred since the 1950s, with most activity occurring in the 1960s. Seeding has been implemented on a very limited scale from the 1970s to the present. The original objectives of rangeland seeding with non-native species were watershed protection and increases in wildlife and livestock forage. Seeding in the Henry Mountains was undertaken to increase forage to accommodate both bison and livestock. Development of various grazing systems resulted in implementing a variety of

vegetation treatments (including seedings), which were used to take grazing pressure off of adjacent native vegetative communities. Most seedings completed since the 1970s have been developed because of emergency fire rehabilitation on sites that were susceptible to erosion and the invasion of noxious weeds and non-native annual grass species (such as cheatgrass).

As mandated in FLPMA and PRIA, a portion of the grazing fees is invested in range improvements, with the expectation that these improvements may benefit wildlife, watersheds, and livestock producers. Using emergency fire rehabilitation funds, additional public land resources have been protected through rehabilitation of burned areas, thereby reducing soil loss and decreasing the ability of noxious weeds and annual non-native grasses to become established. Livestock operators, state and Federal agencies, and other interested public entities have continued to fund rangeland improvement construction.

3.4.2.4 Fundamentals of Rangeland Health and Standards and Guidelines for Grazing Administration

In May 1997, under the authority of the regulations at 43 CFR 4180 (Fundamentals of Rangeland Health and Standards and Guidelines for Grazing Administration), the Utah State Director approved Utah's Standards for Rangeland Health and Guidelines for Livestock Grazing. These standards and guidelines provide a clear statement of agency policy and direction for those who use public lands for livestock grazing and for those who are responsible for their management and accountable for their conditions. The fundamentals of rangeland health combine the basic precepts of physical function and biological health with elements of law relating to water quality and plant and animal populations and communities.

The standards are goals for the desired condition of the biological and physical components and characteristics of the rangelands. These standards are measurable and attainable, comply with various Federal and State statutes, policies, and directives applicable to BLM rangelands, and are the minimum resource condition that must be achieved and maintained. An interdisciplinary team conducts watershed assessments with participation from permittees and other interested parties. The assessments determine whether the Standards for Rangeland Health are being met. The four standards for rangeland health are as follows:

- **Standard 1:** Uplands soils are in proper functioning condition.
- **Standard 2:** Riparian and wetland areas are in proper functioning condition.
- **Standard 3:** Desired species, including native, threatened, endangered, and special status species, are maintained at an appropriate level.
- **Standard 4:** Water quality meets state standards.

Based on the regulations at 43 CFR 4180, if existing grazing management and livestock use is a significant factor in the nonattainment of a standard, appropriate actions must be taken which will result in significant progress toward attainment of the standard(s).

3.4.3 Recreation

The recreational resources of the lands managed by the RFO represent some of the most unusual and least explored recreation opportunities in the region. However in certain parts of the RFO, increased visitor use is affecting soil, water, vegetation, and wildlife. Conflicts among recreationists are also beginning to increase. In some areas, recreation conflicts with other resources and uses, such as livestock grazing, wildlife habitat needs, and wilderness characteristics.

All of the RFO is included in a recreation fee demonstration project known as the Henry Mountains/Sevier River area. Participation in the recreation fee program is authorized by the Federal Lands Recreation Enhancement Act (FLREA) and allows a field office to collect fees for specific types of recreational uses, and then expend the fees to manage the lands where they were collected. Monies collected have been used to maintain and improve campgrounds and picnic areas, install new informational signs, replace waterlines and hydrants to supply drinking water, monitor recreation uses, improve hiking trails, and generally improve the recreational experience within the RFO.

3.4.3.1 Recreation Management Areas

Recreation Management Areas (RMAs) are BLM's primary means of managing recreational use of the public lands. Public land falls within either a Special RMA (SRMA) or Extensive RMA (ERMA). SRMAs are areas that require a recreation investment, where more intensive recreation management is needed, and where recreation is a principal management objective. These areas often have high levels of recreation activity and valuable natural resources. Under existing land use plans, only a small area at the head of Yuba Lake is established as an SRMA. The Yuba Lake SRMA is and will continue to be managed by the Fillmore Field Office. All other lands are managed as an ERMA. The ERMA consists of areas in which recreation is nonspecialized and dispersed and does not require intensive management (although such areas may contain recreation sites). Although the primary management objective of the ERMA is not necessarily recreation, the large number of attractive recreation sites and areas make recreation management an important consideration.

3.4.3.2 Special Recreation Permitting

As authorized by 43 CFR 2932, four types of uses exist for which special recreation permits (SRPs) are required: commercial use, competitive events, organized groups, and recreation use in special areas.

The BLM issues SRPs for noncommercial use in certain special areas, including long-term visitor areas, river use, and backcountry hiking or camping areas. The RFO issues noncommercial recreation use permits (RUPs) for individual use of three fee-site campgrounds. The RFO issued 254 RUPs during the 2004 fiscal year (FY).

Commercial SRPs are issued for commercial and competitive uses of public lands and organized events. SRPs may be issued for 10 years or less, with annual renewal, after which time outfitters must reapply for permits. The permits are issued as a means of managing visitor use, protecting natural and cultural resources, and for providing a mechanism for accommodating commercial recreational uses. The RFO issued 32 SRPs during the 2004 fiscal year. The total number of participants in recreational activities authorized by SRPs during 2004 was 12,008, generating \$109,077 in revenue.

3.4.3.3 Recreation Visitation

BLM recreation visitation is recorded in the Recreation Management Information System (RMIS). RMIS estimates recreation participation for 65 types of recreation activities recorded at BLM sites and areas based on registrations, permit records, observations, and professional judgment. Visitation is estimated by numbers of participants as well as counted by actual visitor days. Participants are the actual number of people who take part in a recreational activity. A visitor day is a common recreation unit of measure used among Federal agencies. One visitor day represents an aggregate of 12 visitor hours at a site or area.

In the past decade several activities made substantial contributions to total visitation (e.g., total visitor days) within the RFO. Camping, driving for pleasure, and backpacking were the most common forms of recreation. Aggregate OHV use (attributed to ATVs as well as cars, trucks, and SUVs) is another

common form of recreation. Picnicking, hiking, and viewing wildlife, as well as fishing and big game hunting, were also common recreation activities.

Table 3-22 lists the RMIS figures for the RFO for the fiscal years 2001 through 2004.

Table 3-22. Recreation Visitation

Activity	Oct. 2000–Sept. 2001		Oct. 2001–Sept. 2002		Oct. 2002–Sept. 2003		Oct. 2003–Sept. 2004	
	Participants	Visitor Days ¹	Participants	Visitor Days ¹	Participants	Visitor Days ¹	Participants	Visitor Days ¹
Backpacking	72,368	74,079	54,754	56,338	49,766	50,826	50,786	51,610
Camping	128,418	125,787	98,951	96,285	103,968	100,783	105,128	102,144
Climbing (Mountain/Rock)	2,122	583	1,514	414	1,413	353	1,480	370
Driving for Pleasure	156,429	73,151	129,200	55,149	132,402	53,477	132,195	55,034
Environmental Education	2,320	800	1,769	639	1,722	620	1,882	670
Fishing (Freshwater)	26,815	5,890	28,075	6,215	56,103	13,246	53,296	12,581
Gather Non-Comm Prod.	4,885	1,221	4,825	1,206	4,680	1,170	4,455	1,114
Hiking/Walking/Running	80,699	42,967	62,744	31,152	65,323	30,247	66,189	31,507
Horseback Riding	4,905	1,026	4,825	1,005	4,680	975	4,455	928
Hunting—Big Game	22,364	15,878	18,684	12,240	17,955	11,720	17,871	11,945
Hunting—Small Game	9,770	2,035	9,650	2,010	9,419	1,950	8,910	1,856
Hunting—Waterfowl	990	165	1,055	176	2,675	446	2,540	423
OHV (ATV)	75,751	29,652	60,945	22,254	63,062	21,750	63,834	22,492
OHV (Cars/Trucks/SUVs)	76,600	43,785	58,804	31,954	56,483	30,625	57,787	31,836
Pack Trips	2,076	2,078	1,478	1,476	1,413	1,413	1,480	1,480
Picnicking	112,439	9,811	81,422	7,213	78,082	6,916	81,055	7,148
Powerboating	8,110	1,352	8,290	1,382	13,471	2,245	12,800	2,133
Rockhound/Mineral Coll.	4,128	1,032	2,951	738	2,826	706	2,960	740
Row/Float/Raft	2,064	2,069	1,476	1,476	1,413	1,413	1,480	1,480
Snow Play (General)	977	81	965	80	936	78	891	74
Swimming/Water Play	9,125	760	9,360	780	16,181	1,348	15,375	1,281
Target Practice	9,770	814	9,650	804	9,360	780	8,910	743
Viewing (Wildlife)	46,832	7,356	41,131	5,897	50,721	6,586	49,481	6,594
Viewing (All Other)	16,228	1,373	14,732	1,203	14,528	1,177	14,206	1,026
Other	117	141	104	106	155	154	95	86
Total	876,302	443,886	707,354	338,192	758,737	341,004	759,541	347,295

¹ A recreation visitor day is equivalent to 12 hours of participation in a given recreational activity.
Source: Bureau of Land Management, Recreation Management Information System.

3.4.3.4 Developed Recreation Sites

The RFO manages a small number of developed recreation sites as displayed in Table 3-23.

Table 3-23. Developed Recreation Sites, Richfield Field Office

Site Name	Description
Otter Creek Reservoir Fisherman's Beach Tamarisk Point South Point	Minimal day-use facilities, dispersed camping areas, and fishing access to the reservoir. Primary activities are fishing and boating.
Wolverton Mill	Day-use and interpretive facilities at a relocated cultural site adjacent to the BLM office in Hanksville.
Hog Springs Picnic Area	Day-use facility. The site serves primarily as a roadside rest stop, picnic site, and trailhead.
Lonesome Beaver Campground	Fee site with day-use and camping facilities, along with culinary water. Primary use is camping.
McMillan Spring Campground	Fee site with day-use and camping facilities with culinary water. Primary uses are camping, OHV driving, and viewing bison.
Starr Springs Campground/Picnic Area	Fee site that features day-use and camping facilities. Panorama Knoll Nature Trail and the Starr Ranch are at the site. Site is primarily used for camping.
Dandelion Flat Picnic Area	Day-use and primitive camping facilities. Serves picnicking and primitive camping uses. Also serves as a trailhead for Mt. Ellen.
Koosharem Reservoir	Minimal day-use facilities. Primarily serves as a roadside rest stop.

3.4.3.5 Recreation Use Conflicts

Recreational activities can conflict with one another and affect the available opportunities and experiences. For example, heavy use of an area by motorized users can displace non-motorized users. Recreational activities may also conflict with and affect other resources and uses. Examples of recreation conflict and impacts include damage to cultural resources, disruption of grazing activities, and damage to various natural resources. Instances of improper motorized use off designated routes in areas limited to existing/designated routes or closed have been recorded. As improper use is identified, it is rehabilitated by hand if possible. In areas of recurrent use off designated routes, additional signage, barricades and law enforcement presence have been used to resolve the recreation use conflict. There are also instances in which motorized and non-motorized recreation is affecting wildlife habitat and wilderness experiences. Areas of conflict include the Dirty Devil region, Factory Butte, and the Henry Mountains.

3.4.4 Travel Management

Development of the existing transportation system in the RFO has been associated with providing access for resource uses such as mineral development, livestock grazing, and recreation. Increased demand for access to public lands, combined with the research on the impacts of roads to resources and resource uses, has increased the need for a well designed and managed transportation system.

The transportation system includes state, county and BLM system roads, some of which receive regular maintenance. For portions of the transportation system roads that cross BLM-administered land, various government entities and individuals acquire rights-of-way (ROWs) from BLM. Issuance of ROWs is based on access needs and resource considerations. State and county system roads (depending on class of the road) are usually constructed and maintained to higher standards than BLM roads and provide the primary arterial and collector road systems for access to and through BLM lands. These state and county system roads are not maintained by BLM.

There are some locations within the RFO that are known and occasionally used for aircraft landing and departure activities that, through such casual use, have evolved into backcountry airstrips. Backcountry airstrips in the RFO receive occasional use by backcountry pilots to camp, explore, or for safety purposes.

In addition to arterial and collector routes, there are numerous smaller routes laced throughout the RFO that connect more remote locations to the larger roads. These routes are used for recreational purposes, access to range improvements, mineral developments, and non-BLM managed in-holdings. Most of these routes are not paved and most are unimproved in nature; they are of native surface (dirt, gravel, or sand). The BLM utilized a variety of methods to inventory existing routes/ways within the RFO for consideration in the planning process, including Global Positioning System data (when available), data provided by the counties, map and orthophoto data, and staff/cooperator knowledge. Based on this inventory, the BLM identified 4,380 miles of routes/ways (Map 3-10) within the RFO. It should be noted that route designations are implementation decisions and that the resulting transportation network could change over time. Detailed route inventory maps by alternative will be available for review at the Richfield Field Office and on the project website for the Richfield DRMP/DEIS at <http://www.blm.gov/ut/st/en/fo/richfield/planning.html>. Work on a route inventory and route designations is ongoing and will be refined between the Draft EIS and Final EIS. Comments on the route inventory and proposed route designations are invited during the DRMP/DEIS comment period.

3.4.4.1 Off-Highway Vehicles

Management direction for off-highway vehicles is provided in 43 CFR 8340, BLM Manual 8340, and the BLM National OHV Management Strategy. Resource management plans designate areas as open, closed, or limited to OHV use. Under the existing land use plans, 77% (1,636,400 acres) of the RFO is open to cross-country OHV use, 13% (277,600 acres) is limited to existing/designated/maintained routes, and 10% (214,000 acres) is closed to OHV use (Map 2-12).

The number of off-highway vehicles registered in Utah grew nearly 70% between 2001 and 2004. Registrations of OHVs within counties in the planning area have grown as well. County and statewide OHV registrations are shown in Table 3-24.

Table 3-24. OHV Registrations

County	2001	2002	2003	2004
Garfield County	353	585	569	745
Piute County	195	256	281	367
Sanpete County	2,594	3,060	2,969	3,885
Sevier County	3,523	3,819	3,708	4,554
Wayne County	277	344	341	462
State Total	95,569	127,556	124,954	161,350

Note: Registrations are for State of Utah fiscal year (July 1–June 30).

Source: Eric Stucki, Utah Division of State Parks, Personal communication 2004

The 11 WSAs within the RFO are designated as either closed or limited to OHV use. There are 188,600 acres closed to OHV use and 258,300 acres where OHV use is limited to identified routes. Within the use areas, there are 42 miles of inventoried routes within WSAs that are currently open to motorized travel.

The Factory Butte area in the eastern portion of the RFO was identified as open to off-highway vehicle use under 43 CFR 8342.1 in the 1982 Henry Mountain Management Framework Plan (MFP). One section of land (640 acres), commonly referred to as Swingarm City, was identified as an OHV activity area.

This section of land was where the most intensive use was occurring. OHV use in the Factory Butte area has continued to increase and expand beyond the OHV activity area to the point that OHVs are causing or will cause considerable adverse effects upon threatened and endangered plant species in the area. In September 2006, a restriction order notice was published in the Federal Register for the Factory Butte area. The restriction order limited OHV use to designated routes on 142,023 acres of the Factory Butte Area. The order did not affect OHV use within Swingarm City; 2,602 acres remained open as an OHV activity area and the 3,843 acres of North Caineville Mesa remained closed to OHV use. This restriction order will remain in effect until the RFO DRMP becomes final.

The Paiute and Great Western Trail systems run through the western and central portions of the planning area. They are managed under a memorandum of understanding (MOU) between the BLM, the Forest Service, the State of Utah, and several local governments. The Paiute Trail System is a 900 mile system that crosses several BLM Field Office jurisdictions, as well as U.S. Forest Service, State, Indian reservation and private lands. The RFO manages 136 miles of the Paiute trail system. A portion of the Great Western Trail System also crosses the planning area, the majority of which is on U.S. Forest Service lands. The Great Western Trail totals 138 miles within the planning area, with only 4 miles on BLM-administered land.

Use of these trail systems has been monitored over the past nine years using trail counters to provide readings of use trends over time. During the 2003 season, the BLM used 25 infrared trail counters strategically located across the two trail systems. Use data is also based on observations and comparisons offered by Paiute Trail rangers, district trail managers, trail hosts, and representatives from the BLM, state parks, Paiute ATV Trail Committee, and the Southern Utah OHV Club. Most use (90%) was via ATVs, with motorcycles and jeeps accounting for the remaining 10%. This report does not include snowmobile use.

The Paiute system sustained a 16% use increase between 2002 and 2003, while the Great Western Trail experienced a 4% increase during the same period. Results are reported in Table 3-25.

Table 3-25. Paiute ATV and Great Western Trail Systems Estimated Use

Trail	1995	1996	1997	1998	1999	2000	2001	2002	2003
Paiute ATV Trail	18,000	17,268	24,866	29,663	38,618	43,367	45,310	43,152	50,245
Great Western Trail	5,600	5,450	11,755	11,571	13,514	12,137	14,851	13,579	14,167
Total Annual OHV Use	23,600	22,718	36,621	41,234	52,132	55,504	60,161	56,731	64,412

Source: USFS 2003.

Growth of OHV use has become a significant issue within the planning area because of concerns related to the potential resource degradation that can result from unmanaged use.

3.4.5 Lands and Realty

Public land policy in the United States fundamentally changed with passage of FLPMA in 1976, which directed that "public lands be retained in Federal ownership, unless as a result of the land use planning procedure provided for in this Act, it is determined that disposal of a particular parcel will serve the national interest..." The lands and realty program is a support program to all other resources and resource uses. The goals of the lands and realty program are to manage the public lands to support the goals and objectives of other resource programs, provide for uses of public lands in accordance with applicable laws and regulations while protecting sensitive resources, and improve management of the public lands through land tenure adjustments. The program responds to requests for rights-of-way (ROWs), permits,

leases, withdrawals, and land tenure adjustments from other programs or outside entities. The frequency of such requests is anticipated to increase as neighboring communities grow and the demand for use of public lands increases. As a result, future management of the lands and realty program will likely become more intense, complex, and costly.

The primary responsibilities of the lands and realty program include land tenure adjustments, withdrawal review, ROWs, and other land use authorizations. The following sections describe the current conditions and status of the lands and realty program within the RFO.

The planning area is comprised of approximately 5.4 million acres in Sanpete, Sevier, Piute, and Wayne counties, and portions of Garfield County (see Map 1-1). There are also 21,500 acres of Kane County within the planning area. However, these acres lie entirely within Glen Canyon National Recreation Area so no decisions within this RMP will affect those lands. Within this area BLM manages 2.1 million acres of public land surface and mineral estate, and an additional 95,000 acres of split estate lands (Federal minerals where the surface estate is in state or private ownership). Split estate lands by county are:

- Garfield County: 7,600 acres
- Piute County: 2,800 acres
- Sanpete County: 40,400 acres
- Sevier County: 36,300 acres
- Wayne County: 7,900 acres

The BLM also has administrative responsibility for 2,082,865 acres of mineral estate where the surface is managed by other Federal agencies (U.S. Forest Service and National Park Service). Table 1-1 (in Chapter 1) summarizes the surface land ownership within the planning area.

3.4.5.1 Land Tenure Adjustment

Land tenure adjustments are often associated with accommodating public and private needs, fulfilling State of Utah entitlements, community expansion, consolidating public land, acquiring and protecting important resources, acquiring access to public lands, or serving a national priority. All land tenure adjustments must be in conformance with applicable land use plans and be subject to valid and existing rights. BLM uses several authorities to make land tenure adjustments through disposal and acquisition, including FLPMA and the Recreation and Public Purposes Act.

3.4.5.1.1 Disposals

Lands can be disposed of through sale, exchange, state quantity grant, color of title, state In Lieu selection, desert land entry, Carey Act entry, patent under the Recreation and Public Purposes Act or through Federal legislation. Public lands have potential for disposal when they are isolated and/or difficult to manage. Disposal actions are usually in response to public request, such as community expansion. Disposals result in a title transfer, wherein the lands leave the public domain. All disposal actions are coordinated with adjoining landowners, local governments, and current land users. Disposal actions require a site-specific environmental analysis in accordance with NEPA (unless the disposal is a result of Federal legislation and is exempted from NEPA review). This NEPA analysis may reveal resource conditions that could not be mitigated to the satisfaction of the authorized officer and may therefore preclude disposal.

Public sales of BLM lands are managed under the disposal criteria set forth in Section 203 of FLPMA and the Federal Land Transaction Facilitation Act. Public lands determined suitable for sale are offered on

the initiative of BLM unless their disposal was directed by Federal legislation. The lands are sold at not less than fair market value. Specific lands suitable for sale must be identified in the applicable land use plan. Any lands to be disposed of through sale that were not identified in the land use plan would require a plan amendment before a sale could occur. Public lands classified, withdrawn, reserved, or otherwise designated as not available or subject to sale are unavailable.

Lands can also be disposed of as directed by Federal legislation. Two past examples of this within the planning area are:

- Public Law 98-219 (dated February 17, 1984) provided for the transfer of title to 1,273.54 acres of public land within the RFO to the Paiute Indian Tribe of Utah.
- Public Law 102-292 (dated May 26, 1992) transferred title and jurisdiction of 10,172.89 acres of public land within the RFO to the Secretary of Agriculture. These lands were added to and administered as part of the Fishlake National Forest.

Disposal actions were considered in previous land use plans. Of the five existing land use plans that cover lands currently administered by the RFO, only the Mountain Valley MFP originally identified lands for sale. These land use plans have subsequently been amended to allow additional land sales. To date, a total of 3,557.63 acres have been sold in the RFO under authority of Section 203 of FLPMA. In addition, since the existing land use plans were prepared 335.48 acres of public land have been disposed of through exchange; 1,171.94 acres have been disposed of by R&PP sales; 83.02 acres have been disposed of by placer mineral patent; and 640 acres have been disposed of by state grants. Future disposal actions are anticipated, as lands are identified for consideration for disposal to consolidate public land, facilitate community expansion, and remove from Federal jurisdiction land parcels that are isolated or difficult to manage.

3.4.5.1.2 Acquisitions

Acquisition of lands can be pursued to facilitate various resource management objectives. Acquisitions, including easements, can be completed through exchange, purchase, or donations. Land exchanges are initiated in direct response to public demand, or by BLM to acquire sensitive resources and/or improve management of the public lands. Exchange proposals are evaluated on a case-by-case basis to determine if the proposed exchange would be in the public interest and would achieve RMP goals and objectives. A total of 36.37 acres of private land within the RFO have been acquired by BLM since the existing land use plans were prepared. Future land acquisitions are anticipated, as opportunities arise to acquire access to public lands and protect important resources.

3.4.5.2 Withdrawals

A withdrawal is a formal land designation which has the effect of reserving land for a certain use. Withdrawals remove certain public lands from the operation of one or more of the public land laws, excluding lands from settlement, sale, location, or entry, including under the general mining laws and mineral leasing laws. Withdrawals are used to protect major Federal investments in facilities or other improvements, reserve lands for specific purposes and use, support national security, protect resources, and provide for public health and safety.

Section 204(l) of FLPMA requires the review of existing withdrawals to determine if they are still serving the purposes for which they were made. If the withdrawals are no longer serving their intended purpose, they are to be revoked and the lands opened or partially opened to the uses that were previously prohibited. If withdrawals are determined to still be meeting the purposes for which they were made, they

are recommended for extension for a specific term. While BLM can make recommendations to designate, revoke, or extend withdrawals, only the Secretary has the authority to actually take these actions.

Approximately 154,700 acres of public land in the RFO are currently withdrawn for various purposes as shown in Table 3-26. More detailed information on these existing withdrawals can be found in Appendix 5 (Table A5-7). There are currently no withdrawal applications pending. The lands listed in Table 3-26 are subject to withdrawal review.

Table 3-26. Existing Withdrawals on Public Lands within the RFO

Withdrawal Type	Segregative Effect	Affected Acres
Public Water Reserve	Lands included within public water reserves are withdrawn from settlement, location, selection, sale, or entry. They are withdrawn from location of non-metalliferous minerals.	12,230.77
Henry Mountain Administrative Site	Lands are withdrawn from settlement, sale, location, or entry under the general land laws, including the mining laws, but not to leasing under the mineral leasing laws.	41.21
Federal Energy Regulatory Commission (FERC)	When an application is filed with FERC, the lands are withdrawn from operation of the public land laws. However the lands remain open to location, lease, or disposal of the mineral estate. The issuance of a FERC permit or license withdraws the lands from operation of the mining laws.	1,207.08
Power Site	Lands are withdrawn from all forms of entry, selection, disposal, settlement, or location.	72.80
Oil Shale	Lands are withdrawn from lease, except oil and gas and sodium leasing, or other disposal, and from appropriation under the general mining laws.	141,144.65
Total		154,696.51

Source: BLM 2004c.

3.4.5.3 Rights-of-Way

Approximately 475 rights-of-way (ROWs) exist within the RFO, authorizing construction, operation and maintenance of power lines, electric substations, telephone lines and cables, irrigation and culinary water pipelines, springs and wells used for irrigation and culinary purposes, reservoirs, communication sites, ditches and canals, roads, highways, material sites, and other similar uses. These ROWs have been granted to the State of Utah, various counties, individuals, corporations, rural electric associations, partnerships, and other entities. Whenever feasible, BLM encourages joint use and placement of new facilities in previously-disturbed areas such as existing communications sites, roads, and highways. There are no officially designated ROW corridors in the planning area; however, there are several physical corridors containing facilities that are not formally designated by a land use plan. The BLM is currently addressing designation of energy corridors in an interagency Programmatic EIS for the Western United States (see Section 1.6.4 in Chapter 1).

Prior to 1982, ROWs for Federal aid highway projects were issued using the same procedures as for other ROWs. After 1982, these ROWs were processed in accordance with an interagency agreement. The Federal Highway Administration (FHWA) may request the appropriation of public lands from BLM for highway or mineral material site ROWs for highway purposes only. The BLM then issues a Letter of Consent to FHWA, and FHWA in turn issues a Highway Easement Deed to the respective state agency. FHWA administers the deed. Since 1982, the BLM has issued over 90 authorizations for Federal aid

highway projects statewide. Several of these projects were connected with the construction and/or associated maintenance of Interstate 70, Highway 50, Highway 24, and other major highways in the RFO.

There are several major power transmission lines in the western part of the RFO that connect to the substation located near Sigurd, and numerous power distribution lines scattered across the RFO. There are currently 16 ROWs that authorize culinary water sources within the RFO. Details on these ROWs can be found in Appendix 5.

Communication sites host communication equipment and facilities for various uses, such as television, radio, microwave, seismograph, and cellular. There are currently 37 communication sites throughout the RFO; the BLM has issued 38 ROW grants for various communication uses at these sites. Detailed information is shown in Appendix 5 (Table A5-10).

3.4.5.4 Leases and Permits

Land use permits authorize short-term uses of public land involving little or no land improvement, construction, or investment. They can also be used to authorize uses that cannot be authorized under other authorities. A temporary use permit authorizes short-term use of public land for activities connected with construction, operation, maintenance, or termination of a ROW.

Leases are usually issued for longer periods of time than permits. The types of leases that can be issued by the BLM are:

- Leases issued under the authority of Section 302(b) of FLPMA
- R&PP leases
- Airport leases

Section 302(b) leases authorize uses such as residential, agricultural, industrial, and commercial, as well as uses that cannot be authorized under other authorities and that involve substantial construction, development, or land improvement and investment. R&PP leases authorize uses such as parks, shooting ranges, cemeteries, sanitary landfills, and other recreation and public purposes. Airport leases, as the name implies, authorize public airports.

R&PP leases have been issued for landfill sites, shooting ranges, parks, and other recreation and public purposes. Since 1982, approximately 35 R&PP leases have been issued for public lands within the RFO, of which nine are currently active. The decrease in R&PP leases can be partially attributed to a conversion of some leases to patents and also to a change in BLM policy that occurred in 1988. The policy was (and is) that no new sanitary landfill sites would be authorized on public land, that all existing R&PP leases for such sites would be terminated as quickly as possible, and that existing landfill sites would either be sold or closed and rehabilitated. This policy was adopted to minimize the potential liability associated with such sites. The R&PP Act was amended in 1988, allowing for the disposal (sale) of public lands to be used for the purpose of solid waste disposal or for any other purpose that includes the disposal, placement, or release of any hazardous substance. Sites other than landfills that qualify include shooting ranges, municipal water treatment plants, and municipal equipment storage facilities. Presently all R&PP leases for sanitary landfill sites have been terminated. Of the nine active R&PP leases in the RFO, four authorize shooting ranges. Information about these ranges is included in Appendix 5 (Table A5-11). The other five existing leases authorize parks and a riding arena.

3.4.5.5 Renewable Energy

Renewable energy generally is defined as energy derived from sources such as wind, solar, and biomass. Wind energy refers to the kinetic energy generated from wind produced by power-generating turbines. Solar energy includes electricity generated from photovoltaic panels. Bioenergy from biomass refers to energy from organic waste products that are either burned directly or converted to fuels that can be burned to produce energy.

A recent study, *Assessing the Potential for Renewable Energy on Public Lands* (USDI and USDOE 2003) presented a nationwide overview of renewable resources on BLM lands in the western U.S. The study employed several screening criteria to consider factors that would impact the economic and technical feasibility of renewable power production. This would help to determine the true potential of an area to produce renewable energy. Screening criteria used in the assessment included access to roads and transmission facilities, available land surface, site condition, land use restrictions, distance to population centers, government policies, and regional market conditions. The primary goal of the assessment was to identify BLM planning units in the western U.S. with the highest potential for development of renewable energy.

The assessment indicates that portions of the RFO have a high potential for solar, wind, and biomass energy. However, the potential for development of these resources is moderate to low due to distance from roads, transportation facilities, and population centers. There are no renewable energy facilities currently present within the RFO.

In June 2005, the BLM published the Wind Energy Development, Final Programmatic Environmental Impact Statement (PEIS) (BLM 2005c). This PEIS evaluates the potential environmental and socioeconomic impacts associated with wind energy development on BLM-administered lands in 11 western states over the next 20 years (e.g., 2005-2025). To determine where potential development might occur on the basis of land status and wind energy resources, the National Renewable Energy Laboratory (NREL) constructed a maximum potential development scenario to project the amount of wind power that might be generated over the next 20 years in the 11-state study area. The projection included an assessment of the potential wind power supply and demand. Maps depicting BLM-administered lands with low, medium, and high potential for wind energy development were constructed for each of the BLM Field Offices in the 11-state study area. These maps serve only as a preliminary screening tool for site selection. Developers must still investigate the properties of the wind regime at any candidate site in much greater detail before assigning a practical value to the site and deciding on a course of development.

High and medium wind resource levels are identified within the most eastern portion of Sevier County, Utah, which is located near 345-500 kV transmission lines. High and medium wind resource levels are also identified between Loa, Bicknell and East of Hanksville, Wayne County, Utah; and several isolated locations disbursed throughout Garfield County, Utah. Because of the remote nature and lack of existing infrastructure at the Wayne and Garfield County locations, the wind energy may not be economically developable and may create potential economic and resource impacts.

Solar resources are considered minimum to low throughout the RFO (five to six kilowatt hours per square meter per day). The six kilowatt hours concentration is primarily located within the northwestern portion of Wayne County, while the five kilowatt hours concentration is primarily concentrated within Sanpete, Sevier and Piute Counties.

The programmatic policies and BMPs in the proposed Wind Energy Development Program are appropriate for wind energy development activities in the RFO (see Appendix 15).

3.4.6 Minerals and Energy

BLM minerals management policy falls into three categories: leasable minerals, locatable minerals, and salable minerals, which are respectively subject to the Mineral Leasing Act of 1920, the general mining laws, and the Materials Act of 1947 and their respective amendments and implementing regulations. Leasable fluid minerals include oil and gas, coalbed methane, geothermal resources, and tar sands. Leasable solid minerals include coal and sodium. Locatable minerals include metals such as uranium, molybdenum, gold, copper, and manganese, and can include non-metals such as gypsum and limestone. Salable minerals (mineral materials) include sand and gravel, clay, stone, and humate.

The following sections contain summary information concerning mineral resources within the planning area. More specific information is contained in the Mineral Potential Report (BLM 2005b) and the coal resource evaluation reports (Appendix 8). The Reasonably Foreseeable Development Scenario for Oil and Gas and Geothermal Resources (RFD) contains information about anticipated activities related to those fluid minerals (Appendix 12).

3.4.6.1 Leasable Minerals

Exploration and development of leasable minerals are accomplished in several stages of activity. For the BLM, the process of leasing is three-fold. The first stage (land categorization through land use planning) involves determining which public domain lands are available for leasing and under what conditions. The second stage is leasing. The third stage includes exploration, development, and production operations. Leasing for fluid minerals and solid minerals follows different regulatory requirements specific to 43 CFR 3100 for oil and gas, 43 CFR 3200 for geothermal resources, 43 CFR 3400 for coal resources, and 43 CFR 3500 for non-energy solid minerals. For oil and gas, geophysical operations do not require a lease. Leases include the right to explore (usually drilling) and to develop any producible oil and gas. All oil and gas leases are offered competitively, and if not bid on, noncompetitively for two years. Leasing of geothermal resources is similar to oil and gas. Coal resources require a license for exploration, and a lease for development (production). All coal leasing is by competitive bidding. Non-energy solid minerals require a prospecting permit or license for exploration, and leases are offered competitively, by preferential right, or noncompetitively.

For oil and gas leasing, the BLM has developed leasing categories to be applied to all public lands to indicate availability for such leasing. The first three categories are open subject to the terms of the lease. The fourth category precludes oil and gas leasing altogether. These categories are described below.

- **Open Subject to Standard Lease Terms** – Areas identified as being open to exploration and development subject to standard lease terms and conditions.
- **Open Subject to Timing Limitations and/or Controlled Surface Use (CSU) (minor constraints)** – Areas identified with these stipulations are open to exploration and development with relatively minor constraints. A Timing Limitation would preclude activities during specified timeframes to protect resource values such as wildlife species. A Controlled Surface Use stipulation would require proposals for oil and gas activities to be authorized according to the controls or constraints specified, such as a distance or buffer from a particular area.
- **No Surface Occupancy (major constraint)** – Areas identified as No Surface Occupancy are open to exploration and development, but with the major constraint of precluding oil and gas activities that utilize the surface of the land.
- **Closed** – Areas identified as Closed are not available for oil and gas leasing.

Leasing for coal involves identifying lands that may have a minable coal resource, applying unsuitability criteria, and considering the impacts of coal exploration and development on other resources and vice versa. For non-energy solid leasable minerals, lands that are open or closed to leasing must be identified along with any area-wide terms, conditions, or other special considerations needed to protect other resource values during exploration or development.

3.4.6.1.1 Oil and Gas

The USGS has identified eight oil and gas plays within the planning area. These are discussed in detail in the Mineral Potential Report (BLM 2005b). In simplest terms, oil and gas are most often found in the pore spaces of sedimentary rocks, such as sandstone and limestone, having migrated there from source rocks, such as marine shales, rich in organic material. When rocks containing this organic material are subjected to heat and pressure, the organic compounds break down over time, resulting in oil and natural gas. As the oil and gas are generated, they migrate through the pore spaces of the rock or along fractures until they encounter a structural or stratigraphic trap with an impermeable seal.

In the Mineral Potential Report, high and moderate potential for oil and gas are identified for the planning area. Most of the planning area has a high potential with a variable degree of certainty. Moderate potential is assigned to most of Piute County and a relatively small area east of Factory Butte in Wayne County.

Coal bed methane (CBM) is a gas associated with coal beds. During the coalification process that accompanies burial, organic matter is converted into coal and methane gas is produced, along with water, carbon dioxide, nitrogen, and heavier hydrocarbon fractions (Rice 2000). A portion of this methane becomes trapped as the coal seam is compacted and can later be extracted as an energy resource.

CBM is produced by pumping water out of the coal, thereby lowering the hydrostatic pressure, which causes methane to desorb from the coal and migrate through the coal cleats and fractures to the production well. Initially, large amounts of water are produced before methane gas can desorb and begin to flow toward the well bore. As the coal beds are de-watered, methane gas production from the well increases over time. Eventually, gas production declines as ground water production diminishes in the last stages of a well's production.

CBM production poses some significant environmental issues, most notably the production of large volumes of water, particularly in the early stages of well development. Although water produced from CBM wells can be potable, it is frequently saline to hypersaline and may contain total dissolved solids (TDS) at concentrations up to 170,000 mg/L (USGS 2000). Produced water from CBM wells can also have high concentrations of dissolved organic constituents and metals. Depending on the water quality, the produced water is disposed of as waste or used for beneficial purposes, although some treatment is often required. Disposal includes surface discharge including evaporation or injection in subsurface formations. Uses include livestock watering, irrigation, watering artificial wetlands, or water supplies.

Exploration and development of CBM differs somewhat from conventional gas within the planning area. Two CBM plays are identified within the planning area, both associated with Cretaceous coal beds. The Uintah and Piceance Basin play is associated with the Ferron Trend that approximately extends from Price southward onto the Wasatch Plateau. The other play is generally on the west side of the Henry Mountains, east of Capitol Reef. The Ferron Trend is assigned a high potential for the occurrence of CBM, and the play west of the Henry Mountains is assigned a moderate potential, except for low potential in the vicinity of Factory Butte.

A reasonable foreseeable development scenario predicting the likelihood of oil and gas exploration and development over the next 15 years within the planning area was developed as part of this planning effort and is included in Appendix 12. The RFD is summarized in the following paragraphs.

The USGS estimates the distribution of undiscovered, technically recoverable hydrocarbon resources in the planning area to be 0 to 20,000 barrels of oil per square mile. As of 2004, some 220 exploration wells have been drilled in the planning area (IHS Energy Well Data 2004). The historical number of wells drilled each year is slightly over 3.

A discovery of oil in 2004 in western Sevier County at the Covenant field near Sigurd has promoted interest in oil and gas exploration in the western part of the planning area. Since then, the interest in leasing, the number of miles of seismic surveys, and the number of exploration wells has increased substantially and is mainly focused on the Sevier and Sanpete Valleys, although other areas within the thrust play are being explored.

Since the discovery, a large acreage of public land in the vicinity of the Sevier and Sanpete Valleys has been nominated for leasing, and the bidding for leases has been very competitive. Map 3-11 shows the current leases in the planning area. The RFD assigns a high level of activity (high development potential) and predicts 360 wells to be drilled in the western part of the planning area in the vicinity of the Sevier and Sanpete Valleys.

Two other areas have been of interest for leasing in recent years. On the Manti-LaSal National Forest, Federal leases are authorized on the Wasatch Plateau and are associated with the Cretaceous Sandstone and coal bed methane plays. Only a few leases are authorized on the Fishlake National Forest on the Wasatch Plateau or elsewhere on the Forest at this time, but the BLM anticipates additional leasing in these areas in the future. In the RFD, 49 wells are predicted in the vicinity of the southern part of the Wasatch Plateau with a moderate level of activity (moderate development potential).

The other area that has been of interest for leasing in recent years is generally in the vicinity of the Dirty Devil River and the benchlands above the river. As of August 2007, there has been no on-the-ground activity.

Aside from the Sevier and Sanpete Valleys and the southern Wasatch Plateau, the planning area is assigned a low activity level (low development potential). In these areas, the historic drilling rate is applicable at 3 wells per year or 45 wells during the next 15 years.

As of April 2007, there are 223 oil and gas leases on BLM land, 3 leases on the Fishlake National Forest, and 30 leases on the Manti-LaSal National Forest.

3.4.6.1.2 Geothermal Resources

Geothermal resources found on the Federal mineral estate are considered leasable minerals. As such, the same laws governing other leasable minerals cover exploration and development of these resources.

Interest in the potential geothermal resources in Utah increased in the early 1970s, and lease applications were filed around all areas with hot springs or other evidence of geothermal activity, including the hot springs in the vicinity of Monroe and Joseph within the planning area. The Monroe-Joseph Known Geothermal Resource Area (KGRA) was designated in 1974 due to anticipated interest in leasing geothermal resources in the Sevier Valley. The KGRA contained 16,363 acres in two separate parcels surrounding the Joseph hot spring and Monroe-Red Hill springs. Designation of this area as a KGRA meant that future leases could be obtained only through competitive bidding. For the town of Monroe, a

limited number of gradient holes and one test production hole were drilled under a Department of Energy grant to explore the potential of using the geothermal resource for space heating. The drilling did not delineate an adequate resource of high enough temperature for the proposed use, but again, the exploration was very limited.

In the 1980s, interest in geothermal resources waned, and in 1988 the KGRA was declassified after a competitive lease sale without any public interest. Currently, Federal geothermal resources in the Sevier Valley or elsewhere in the RFO are not leased.

The Mineral Potential Report identified areas with high, moderate, and low potential for the occurrence of geothermal resources in the planning area. In general, the western part of the planning area is assigned to high and moderate potential, and the eastern part is assigned to low potential.

The high potential area is centered on the Sevier and Sanpete Valleys and flanking ranges. The high potential is based on the known hot springs, including Monroe, Red Hills, and Joseph and a favorable geologic setting with a relatively high heat flow and with faulting that would appear to provide conduits for the migration of geothermal resources. Monroe and Red Hill springs are located 0.5 mile east of the town of Monroe, while Joseph hot spring is located five miles southeast of the Town of Joseph, all in southwestern Sevier County. Maximum water temperature measured at Monroe, Red Hills, and Joseph range from 151° F. to 171° F. (Utah Geological Survey 2004). Reservoir temperatures have been estimated at slightly over 212° F., which is low for energy production; however, the resource potential has not been extensively explored. Commercial development includes the use of the hot springs at Red Hills and Monroe and a spring at Richfield, both non-Federal minerals, for heating swimming pools, a direct use.

The moderate potential area generally encompasses the Southern High Plateaus and adjacent valleys not included in the area of high potential in the western part of the planning area. The eastern part of the planning area is considered low potential. In the Mineral Potential Report, geothermal resource development was considered unlikely in the next 15 years. However, the first competitive geothermal resource lease sale will be held this year (2007) for Federal minerals at the Cove Fort-Sulphurdale Known Geothermal Resource Area, west of the planning area in Beaver and Millard Counties, and interest in geothermal resources for energy production is increasing state-wide.

The lands managed by the RFO are open to geothermal leasing, subject to the oil and gas leasing categories. As previously stated, no Federal lands are currently leased for geothermal resources in the RFO.

3.4.6.1.3 Oil Shale and Tar Sands

3.4.6.1.3.1 Oil Shale

Oil shale is a very fine-grained, dense, sedimentary rock that is rich in organic material. The organic material in these sediments can be converted into low viscous oil during thermal decomposition. In the planning area, oil shale deposits occur in the Green River Formation in Sanpete County and Sevier County.

In the planning area, lands with surface exposure of the Green River Formation were withdrawn from lease or other disposal by Executive Order in 1930 in order to reserve the oil shale for the purposes of investigation, examination, and classification. Subsequent EOs and public land laws have modified the original EO. The withdrawal generally overlaps parts of the Gunnison Plateau, the Valley Mountains, and the Wasatch Plateau. The lands withdrawn for oil shale investigation are open to oil and gas as well as sodium leasing but are closed to mineral entry (mining claim location and operations) and certain realty

actions. The Federal lands withdrawn for oil shale investigation are shown on Map 11 in the Mineral Potential Report, and the lands withdrawn are classified as prospectively valuable for oil shale. Oil shale was not addressed in the Mineral Potential Report, since only limited information is available on the mineral potential in the RFO.

Under the Energy Policy Act of 2005, the BLM is required to develop regulations for the leasing of oil shale deposits. This leasing of oil shale, as well as tar sands, is being addressed in the ongoing Oil Shale and Tar Sands Leasing Programmatic EIS for the Western United States (see Section 1.6.3 in Chapter 1).

3.4.6.1.3.2 Tar Sands

Tar sands are loosely defined as any sedimentary rock impregnated with heavy, viscous crude oil that cannot be recovered by conventional techniques but rather requires an external energy source (e.g., heat) to mobilize the oil. Tar sands are also called bituminous sandstone, oil sands, and oil-impregnated rocks. In the planning area, the heavy oil is contained in sandstone, not sand as in Alberta, Canada.

Areas of high and moderate tar sand occurrence potential were identified in the planning area. In eastern Wayne and Garfield counties, high potential is assigned to the Tar Sand Triangle, which is primarily east of the Dirty Devil River, and to the Circle Cliffs in the vicinity of Capitol Reef National Park. The Tar Sand Triangle encompasses approximately 230 square miles with an estimated 16 billion barrels of oil. At the Circle Cliffs, the Waterpocket Fold (Capitol Reef) is the eastern limb of the Circle Cliffs structure, and the western limb is in Grand Staircase-Escalante National Monument. The Circle Cliffs are estimated to contain more than 860 million barrels of oil. The Tar Sand Triangle and the Circle Cliffs, in part, are defined as Special Tar Sand Areas (STSAs) due to known and delineated tar sand occurrences. In addition to the STSAs, there are indications of tar sand deposits in scattered outcrops along the Waterpocket Fold, and the occurrences are assigned a moderate potential for tar sand resources.

Tar sands contain heavy oil that may be mined or developed by drilling, depending on the depth of the deposit below the surface and the selected extraction method. In addition, the Federal lands with tar sand deposits also have a high potential for oil and gas. In an attempt to address the leasing of both oil and gas and tar sands, the Combined Hydrocarbon Leasing Act was passed in the early 1980s and authorized exploration and development of both conventional oil and gas and tar sands in a combined lease for both, which were called combined hydrocarbon leases, or CHLs. Existing oil and gas leases within the STSAs were to be converted to CHLs; however, this conversion process was never completed and the market for oil and gas declined starting in about 1985. A number of existing oil and gas leases are pending conversion to CHLs in the STSAs. (See Maps 10 and 22 of the Mineral Potential Report.)

Under the Energy Policy Act of 2005, the BLM is required to develop new regulations for the leasing of tar sand deposits. As stated above, this leasing of tar sands, as well as oil shale, is being addressed in the ongoing Oil Shale and Tar Sands Leasing Programmatic EIS for the Western United States (see Section 1.6.3 in Chapter 1).

3.4.6.1.4 Coal

Significant coal resources are delineated in three coal fields within the planning area, which are the Wasatch Plateau, Emery, and Henry Mountains coal fields as shown on Map 3-12. The coal resources within the planning area were evaluated for development potential, based on available coal data; assumptions for depth, thickness, and continuity of the deposits; and assumptions on the parameters for certain mining methods. The Wasatch Plateau coal field has the most data; the Henry Mountains, the least. The estimated unleased coal resources with development potential at each coal field are as follows: more than 290 million tons at the Wasatch Plateau, 199 million tons at the Emery, and 1,750 million tons at the Henry Mountains. The coal at the Wasatch Plateau would be mined by underground methods; the

Emery, underground mostly (190 million tons); the Henry Mountains, surface and underground methods (466 million tons and 1,284 million tons, respectively).

Federal coal leases were authorized at all three coal fields in the past, mainly in the 1970s and early 1980s. Development has only occurred at the Wasatch Plateau coal field. The Wasatch Plateau coal field is the only coal field with a producing coal mine at present within the planning area. The SUFCO Mine in Sevier County includes seven Federal coal leases, accounts for about one-quarter of the total coal production in Utah, and the coal production exceeds any other coal mine in Utah. Approximately, 24,000 acres of public lands are under lease at the SUFCO Mine. Production and revenue figures are contained in Table 3-27.

Table 3-27. Sevier County Coal Production¹ (1984–2001)

Year	Units ²	Revenues ³
1984	2,141,000	\$96,113,384
1985	1,797,000	\$74,079,461
1986	2,360,000	\$94,657,512
1987	2,228,000	\$80,983,867
1988	2,625,000	\$82,325,371
1989	3,059,000	\$88,794,500
1990	2,887,000	\$79,919,360
1991	3,079,000	\$81,211,800
1992	2,580,000	\$67,144,882
1993	3,553,000	\$87,581,011
1994	3,569,000	\$81,639,793
1995	3,906,000	\$83,269,860
1996	4,214,000	\$85,263,758
1997	4,939,000	\$97,173,834
1998	5,719,000	\$107,867,625
1999	5,763,000	\$104,468,169
2000	5,906,000	\$102,298,887
2001	6,111,000	\$108,531,360
¹ No coal production has been reported in Garfield, Piute, Sanpete, or Wayne counties between 1980 and 2001. ² Units are shown in short tons (2000 lb). ³ Revenues are in 2001 dollars. Source: BLM 2003b.		

Based on coal resource evaluations, prepared in 2004-2005, exploration and development of coal resources in the Wasatch Plateau coal field are anticipated; however, coal resources in the Emery and Henry Mountains coal fields were not anticipated to be developed within the planning time frame, or before 2030. This forecast for coal resources is likely to change, as market conditions for coal are likely to change.

3.4.6.1.5 Non-Energy Solid Leasable Minerals

Non-energy solid minerals include sodium and potassium. Such minerals in the RFO include salt and alunite. There are currently no prospecting permits or leases for non-energy solid leasable minerals in the RFO. The Sevier and Sanpete Valleys, in part, are underlain by deposits of salt and other evaporitic minerals, and in the vicinity of Marysville, alunite deposits are associated with the volcanic rocks. Salt is currently mined on private land near Redmond, but there is no current interest in leases on BLM-

administered lands. Alunite is an alteration of volcanic rock as clay. Depending on the composition and the proposed use, alunite could be a leasable mineral.

3.4.6.1.5.1 Salt

Saline deposits are loosely defined to include all minerals that have precipitated from waters of either marine or continental origin through evaporation (USGS 1969). Saline potassium minerals, such as sylvite and carnallite, are often referred to as potash, and the most common sodium mineral is halite, which is composed of sodium chloride. Other valuable salts include potassium sulfate, sodium carbonate, sodium sulfate, and salts of magnesium, lithium, bromine, and boron. Saline deposits, explored and prospected for their sodium and potassium content, would be considered as non-energy solid minerals. Within the planning area, salt deposits occur in the Arapien Shale in Sevier and Sanpete Valleys and in the Pennsylvanian Paradox Formation in the subsurface in the eastern part of the planning area.

Salt mining has a long history in the Sevier Valley, dating back to 1879; it was the first mineral resource produced in the valley. Salt has been prospected at several locations in the Arapien Shale in the Sevier and Sanpete Valleys, but there is only one mine now operating, which is the RCS salt mine located on private land near Redmond. This is the only current salt producing mine in Utah besides those on the Great Salt Lake (UGS 2002).

Areas of high salt occurrence potential were identified in the Sevier-Sanpete Valley and in eastern Wayne County. Development of salt deposits on BLM-administered lands within the planning area is considered unlikely in the next 15 years.

3.4.6.1.5.2 Potassium (Alunite)

Alunite may be a non-energy leasable mineral if it is explored and developed for its potassium content. Alunite is either a vein deposit or a clay alteration product, both associated with Tertiary volcanic terranes in the vicinity of Marysvale. The altered alunite deposits are intricately associated with other clays such as kaolinite. In the Mineral Potential Report, clays including alunite were considered as clay only, rather than differentiating specific clays as to alteration types.

Alunite was historically mined in the vicinity of Marysvale. The vein deposits, southwest of Marysvale, were extensively mined during World War I, as well as some altered alunite deposits north and east of Marysvale. The alunite was mined for potassium for use as an explosive material. Subsequently, during World War II, the alunite deposits were investigated as a possible source for alumina; however, alumina deposits in the Pacific Northwest were more prevalent and cheaper to process to aluminum. Following World War II, primarily in the 1950s and 1960s, the deposits were still evaluated as an alumina source as well as for potassium for fertilizer. Since then, given the variable chemical composition of alumina, potassium and other constituents, the deposits have only seen limited interest.

3.4.6.2 Locatable Minerals

Locatable minerals include base metals (such as copper, lead, and zinc), precious metals (such as gold and silver), and some industrial minerals. Locatable minerals are subject to the U.S. mining laws, including the 1872 Mining Law, and are subject to location as mining claims and mineral entry (patenting). Open, unappropriated public land is open to entry and location, unless it has been withdrawn from the operation of the mining laws. Operations under the mining laws are subject to the undue and unnecessary standard in the regulations at 43 CFR Part 3809, and operations in WSAs are subject to the non-impairment of suitability for inclusion in the Wilderness Preservation System under the Interim Management Policy for Lands Under Wilderness Review (IMP).

Developers of these minerals stake a mining claim (location) over the deposit and then acquire the necessary permits to explore or mine. As of October 2004, there were 4,199 active (recorded) mining claims in the planning area, and 3,158 of those are located on BLM-administered lands (March 2007, LR2000 database) (Map 3-13). In addition, there are nine authorized Mining Law Notices filed in the RFO, one plan of operation pending approval, and one plan of operations pending closure when reclamation is complete (May 2007, LR2000 database).

3.4.6.2.1 Metals

Historically, metals have been prospected in the vicinity of Marysville, the Henry Mountains, and the Colorado Plateau. Historically, gold, lead and zinc have been mined in the vicinity of the Tushar Mountains near Marysville; gold and copper have seen limited development in the Henry Mountains; and uranium has been mined in the Antelope Range north of Marysville and in the Colorado Plateau. These mines were generally small-scale, underground operations.

The Mineral Potential Report assigns high, moderate, and low potential for the occurrence of metals in the planning area. The Colorado Plateau in the eastern part of the planning area is rated as having high potential for metals, including uranium, vanadium, and copper (due to favorable sedimentary deposits, known occurrences, and historic mining), as well as gold (due to known occurrences and favorable intrusive rocks). The western part of the planning area, generally in the vicinity of Marysville, is assigned high potential for metals including uranium due to the presence of volcanic and intrusive rocks, known occurrences of precious and base metals and uranium, and historic mining. In the western part of planning area, moderate potential is assigned to the volcanic terrane outside the area of prevalent mineral occurrences and historic mining, and low potential is assigned to the area not associated with volcanic deposits.

The Mineral Potential Report, prepared in 2005, was based largely on market conditions in 2003 when metal prices were generally low. Since that time, the market value of uranium and other metals has increased significantly, and exploration and development for metals are more likely under current market conditions. A substantial number of new mining claims have been located since 2005, most notably for uranium, and exploration activity for uranium in the RFO has increased. Between October 2004 and March 2007, the number of mining claims increased from approximately 1,000 to 5,000. Although development was considered unlikely in the Mineral Potential Report, exploration activity is likely to increase and development is more likely than that reflected in the Mineral Potential Report due to current market conditions in 2007.

3.4.6.2.2 Gypsum

Gypsum is formed by the evaporation of seawater and precipitation of calcium sulfate. Gypsum frequently occurs interbedded with limestone and calcareous shales. Most gypsum mined in Utah, as well as in the United States, is processed for plaster and used in the manufacture of wallboard, lath, and other prefabricated gypsum products. Raw gypsum is used in Portland cement as a setting retardant and in agriculture as a soil amendment.

Within the planning area, exploration and development of gypsum resources has been focused in the Sevier and Sanpete Valleys. Gypsum has been mined from the Arapien Shale since 1918. The gypsum deposits in the Sevier Valley are centrally located in Utah, and wallboard and other products are shipped to regional markets. Mills for processing gypsum are operated by U. S. Gypsum and Georgia-Pacific Corporation near Sigurd, the primary product being wallboard. In addition, Diamond K has constructed a mill at Richfield that processes pulverized gypsum for pharmaceutical uses, and the gypsum for that use is

mined within the San Rafael Swell. In Utah, gypsum production was 500,000 tons in 2000 and 390,000 tons in 2001.

In the Mineral Potential Report, high potential for the occurrence of gypsum was assigned within the planning area. In the Sevier and Sanpete Valleys in the western part of the planning area, high potential is assigned to the known occurrence of gypsum that is associated with the Arapien Shale. In the eastern part of the planning area, gypsum also occurs in the Summerville and other formations; however, gypsum does not occur in beds that are economic to develop at this time.

Development in the Sevier and Sanpete Valleys will likely continue over the next 20 years. Commercial development elsewhere is considered unlikely in the Mineral Potential Report.

3.4.6.3 Salable Minerals

Salable minerals are mineral materials, subject to the Materials Act of 1947 and the Surface Resource Act of 1955 and the regulations at 43 CFR 3600. Mineral materials include sand, gravel, clay, and stone. These minerals are disposed by sale contracts and by free use to government agencies and non-profit organizations. Disposal sites may be authorized for exclusive use and non-exclusive use; non-exclusive use disposal sites are community pits and common use areas. The BLM will not dispose of salable minerals in areas not available by law (e.g., wilderness areas) or in areas identified in land use plans as not appropriate for disposal.

As of May 2007, there are 18 authorized community pits in the RFO that provide commodities such as sand, gravel, topsoil, fill material, and stone. There are 7 exclusive, negotiated sales that provide riprap, sand and gravel, oyster shell, humate, and stone. There are also 15 exclusive, free-use permits in the RFO that provide sand and gravel and fill material. Most of these mineral material sites are for the disposal of sand and gravel material (LR2000 database).

The Federal Highway Administration also obtains sand and gravel and other mineral materials for Federal Highways and Federal Aid Highways. These disposal sites are not authorized as salable minerals under the regulations at 43 CFR 3600. The disposals are authorized as a mineral material ROW under the regulations at 43 CFR 2800. These ROWs are obtained by the Federal Highway Administration.

3.4.6.3.1 Sand and Gravel

Past and present exploration and development of sand and gravel deposits in the planning area has been for local public works projects. The largest single project was the construction of Interstate 70 in the 1970s through the early 1990s. Because sand and gravel are generally the lowest-priced of industrial mineral products, transportation costs from the pit to the point of end use are a large part of the cost to consumers. As such, even short transportation distances can adversely affect the cost of the final product, and it is imperative that sand and gravel sources be located as close as possible to the point of use and major roadways. For this reason, the sand and gravel industry is widely dispersed across Utah, and disposal sites are generally associated with roadways and near population centers.

Most sand and gravel disposals in recent years have been to County Road Departments. Typically, the counties permit disposals that are between 10,000 and 20,000 cubic yards per year. Commercial disposals vary in volume, and most contracts are issued from community pits where the volume ranges from 30 to 500 cubic yards per individual sale.

3.4.6.3.2 Clay

Clay is generally a salable mineral and is used for a variety of commercial and industrial purposes, including bricks, drilling and quarrying mud, sealants, liquid dyes, paints, china, ceramics, absorbents, molecular sieves, fillers, binders, cosmetics, and inert ingredients in pharmaceutical tablets. The end use of the clay is determined by its physical properties and purity. Physical properties that determine clay usage include plasticity, bonding strength, color, vitrification range, deformation with drying and heating, gelation, crystal structure and size, viscosity, and swelling capacity (USGS 1969). Bentonite and bentonitic clays are among the most desirable; they swell when saturated with water and can be used as a natural sealant for reservoirs, stock ponds, ditches, and landfills. High-swelling bentonite is primarily used by the petroleum industry as a component of drilling mud and by the iron industry as a binder in casting molds and casts. As discussed under Section 3.4.6.1.5.2, alunite may be a non-energy solid leasable mineral if it is explored and developed for its potassium content, or a salable mineral as a clay (as an alteration product of volcanic rocks).

In Utah, the most common use for clay is for brick and tile. Within the planning area, clay has been used for swelling clays such as bentonitic clay, reservoir liner material, Fuller's earth, and other applications. Most of the clay resources in the planning area have a volcanic association.

On the western side of the planning area, high potential for the occurrence of clay has been assigned in the vicinity of Marysvale in association with alteration zones in the Tertiary Volcanics and known clay deposits in the Sevier Valley which are also associated with volcanic deposits. This high potential includes alunite deposits. Moderate potential is assigned to the area with volcanic rocks, but where clay alteration is unreported. Two active clay mines exist at Box Creek on the Sevier Plateau in the Fishlake National Forest and at the Redmond clay mine north of Redmond on private land. Other clay deposits have been explored and/or mined in the past on a small scale in the western part of the planning area. A clay prospect in the Antelope Range, north of Marysvale, has been explored in the last 3-4 years for the manufacture of cement and other possible uses.

In the eastern part of the planning area, high potential for clay is associated with outcrop (surface exposure) of the Morrison Formation and Dakota Sandstone. These deposits have been prospected mainly for swelling clays with minor, small-scale development, mostly for local use.

As stated in the Mineral Potential Report, clay is likely to be developed on BLM-administered land during the planning horizon of 15 years, but such development is likely to remain relatively small scale.

3.4.6.3.3 Stone

Stone quarries are found throughout Utah and are generally small-scale operations. Transportation cost is a factor in the location of quarries. Most of the stone quarried in Utah and in the planning area is used by the construction industry for either building stone, aggregate (crushed rock), or cement (pulverized limestone). Volcanic tuffs in Sevier and Sanpete Counties have been quarried for use as dimension stone, crushed for lightweight aggregate in the manufacture of building block, and used as a soil amendment or as nutritional supplement for certain livestock animals, primarily poultry.

In the planning area, stone has been quarried from the following formations for the specified use:

- Limestone of the Green River Formation – building stone
- Sandstone of Crazy Hollow – building stone
- Limestone of the Flagstaff Formation – rock dust, kiln material, and cement manufacturing
- Tuff of the Moroni Formation – poultry feed and agricultural uses

- Tuff of the Joe Lott Tuff – building stone and crushed aggregate as an insulating block
- Tuff of the Bullion Canyon Volcanics – decorative rock (landscape, aquarium display)
- Sandstone of the Moenkopi Formation – building stone
- Navajo Sandstone – decorative rock

In addition to quarrying of stone, the public has utilized pick-up stone or field stone. This material is generally boulders or cobbles and is present in numerous locations in the planning area. The areas that have the most use for collection are generally close to the population centers, and the material of interest has mainly included basalt, tuff, sandstone, or limestone. The demand has been relatively low and the material is disposed in small tonnages. Although field stone is present throughout the planning area, the principle areas of interest have been in the Sevier Valley and near Loa.

Most of the stone quarries in the planning area are relatively small disposal sites, generally less than 5-10 acres. The disposals from BLM public lands range from a few tons to a few thousand tons per year. Development on a small-scale at many quarries is likely to continue.

3.4.6.3.4 Humate

Humates are carbonaceous shale associated with weathered coal beds. The material is mined as a dietary colloidal mineral supplement and as a soil amendment for agricultural applications. Humate increases the water holding and ion exchange capacity of the soil, acts as a pH buffer for alkaline soils, and may aid animal and plant growth as humic acids. Most humate in Utah is mined from coal beds in the Ferron Sandstone of the Mancos Shale. The only active mining in the planning area is in the vicinity of Factory Butte in Wayne County.

In the planning area, high potential for occurrence of humate has been assigned to Ferron Sandstone outcrop in the vicinity of Factory Butte, north of the Henry Mountains and to the east side of the Wasatch Plateau. Moderate potential is assigned to the west side of the Henry Mountains, and low potential is identified in the central and western part the Wasatch Plateau.

As stated above, the only authorized, active mining for humates in the planning area are north of Highway 24, near Factory Butte; two sites are BLM-authorized contracts and one is on State land. The mines are relatively small and only periodically active. Exploration and development are likely to continue in the vicinity of Factory Butte at a small scale and are not considered likely elsewhere in the planning area.

3.4.6.3.5 Other Minerals

Other mineral materials considered in the Mineral Potential Report include oyster shell, petrified wood, jasper, agate, and chalcedony. Oyster shell from the Dakota Formation has been used for road surfacing in Wayne County. There is also interest in oyster shell for agricultural use. It is considered unlikely that the other mineral materials considered will have development beyond hobby or casual use within the next 15 years.

3.5 SPECIAL DESIGNATIONS

3.5.1 Wilderness Study Areas

In 1964, Congress passed the Wilderness Act establishing (1) a national system of lands for the purpose of preserving a representative sample of ecosystems in their natural condition for the benefit of future generations, and (2) a process for reviewing other lands for their wilderness potential. The act originally

applied only to national forests, national parks and national wildlife refuges. With the passage of FLPMA in 1976, Congress directed BLM to also inventory, study, and recommend which public lands under its administration should be designated wilderness.

In 1979, the BLM began a wilderness inventory of 22 million acres of public land in Utah. By 1986, following the inventory and public inventory process, and the settlement of appeals, the BLM designated 11 wilderness study areas (WSAs) within what is now the RFO (see Table 3-28 and Map 3-14). These WSAs total 446,900 acres, about 21% of the RFO. A discussion of the current resource values and uses in each WSA, established in 1980 under the authority of Section 603(c) of FLPMA, can be found in the *Utah BLM Statewide Wilderness Final Environmental Impact Statement* (BLM 1990b). Those values and resources described in the 1990 document have not changed significantly since that time, as documented in monthly WSA monitoring reports available in the RFO.

Although WSAs are by definition roadless, several of the WSAs in the RFO do include inventoried ways. During the 1979-1980 Utah Wilderness Inventory, it was necessary to divide routes used by motorized vehicles into "roads" and "ways." To be considered a road, three criteria had to be met: (1) constructed; (2) maintained by mechanical means; and (3) regular and continuous use. All other motorized routes were defined as ways, which could be left open to motorized travel as long as their use did not "impair" the suitability of the area for wilderness designation. Decisions as to which routes will remain open and which will be closed will be made as part of this land use planning process. The number and miles of inventoried ways are identified by WSA in Table 3-28. Map 3-10, Route Inventory for the RFO depicts routes and how they overlay with WSAs.

Table 3-28. Wilderness Study Areas

Wilderness Study Area	Acreage	Number of Inventoried Ways	Miles of Inventoried Ways
Bull Mountain	13,200	7	3.9
Dirty Devil	72,100	21	15.6
Fiddler Butte	74,000	8	5.5
Fremont Gorge	2,800	1	0.2
French Spring/Happy Canyon	24,300	3	3.6
Little Rockies	40,700	3	1.3
Mount Ellen/Blue Hills	81,400	12	9.3
Mount Hillers	19,300	9	6.6
Mount Pennell	77,100	9	8.1
Horseshoe Canyon (south)	39,900	4	5.6
Portion of the Horseshoe Canyon (north)	2,100	0	0
Total	446,900	77	59.7

FLPMA Section 603(c) directs the BLM to manage the WSAs so as not to impair their suitability for designation as wilderness. The *Interim Management Policy for Lands Under Wilderness Review* (BLM Handbook 8550-1) provides policy guidance to manage WSAs to a non-impairment standard. The wilderness characteristics that must be protected include the appearance of naturalness and outstanding opportunities for primitive and unconfined recreation. The status of the existing WSAs will not change as a result of the Richfield RMP. Only Congress can designate the WSAs as wilderness or release them for other uses.

BLM policies and guidance providing for management of existing WSAs and consideration of values associated with wilderness characteristics in land use planning are detailed in:

- Handbook H-1601-1, Land Use Planning Handbook
- Handbook H-8550-1, Interim Management Policy and Guidelines for Lands Under Wilderness Review

The BLM's IMP provides specific policy and guidance for management of most resource values and uses in WSAs. However, visual resource management (VRM) decisions and OHV designations and route designations are made during land use planning. A summary of some aspects of WSA management are as follows:

- The non-impairment standard applies to all uses and activities except those specifically exempted from this standard by FLPMA (grandfathered uses and valid existing rights).
- Activities that are permitted in WSAs (except valid existing rights and grandfathered uses) must be temporary, create no new surface disturbance, and not involve the permanent placement of structures. There are exceptions to this standard.
- Grazing, mining, and mineral leasing uses that existed as of the passage of FLPMA (October 21, 1976) may continue in the same manner and degree, even if this would impair wilderness suitability.
- WSAs may not be closed to location under the mining laws in order to preserve their wilderness character (although the wilderness character of the area cannot be impaired through actions to perfect claims located after October 21, 1976). Valid existing rights will be recognized.
- WSAs will be managed to prevent unnecessary and undue degradation, as required by law.

3.5.2 Wild and Scenic Rivers

The Wild and Scenic Rivers Act of 1968 (WSRA) established legislation for a National Wild and Scenic Rivers System (NWSRS) to protect and preserve designated rivers throughout the nation in their free-flowing condition and to protect and preserve their immediate environments. The WSRA includes policy for managing designated rivers and created processes for designating additional rivers for the NWSRS. Section 5(d) of the Act directs Federal agencies to consider the potential for national wild, scenic, and recreational river areas in all planning for the use and development of water and related land resources.

The first phase of the WSR review was to inventory all potentially eligible rivers within the RFO to determine which of those rivers are eligible for consideration as part of the NWSRS. To be eligible, rivers must be free-flowing and possess at least one outstandingly remarkable value. Outstandingly remarkable values are evaluated in the context of regional and/or national significance and must be river-related. Each river/segment determined to be eligible is then given a tentative classification based on the current level of human development associated with that river/segment. The tentative classification is based on the criteria listed in the classification table from *Wild and Scenic River Review in the State of Utah* (BLM 1996) as noted below.

- A *Wild* river is free of impoundments, with shorelines or watersheds essentially primitive, and with unpolluted waters.
- A *Scenic* river may have some development, and may be accessible in places by roads.
- A *Recreational* river is accessible by road (or railroad), may have more extensive development along its shoreline, and may have undergone some impoundment or diversion in the past.

The BLM conducted a wild and scenic river (WSR) review as part of this planning process. The BLM inventoried 304 drainages/streams in the lands managed by the RFO. Of those, 12 segments totaling 135 miles were determined to be free-flowing and possess one or more outstandingly remarkable values, making them eligible for further consideration for inclusion in the NWSRS. The eligible rivers, along with their outstandingly remarkable values, tentative classifications, and river miles, are shown in Table 3-29 and on Map 3-15. Detailed descriptions and analysis can be found in Appendix 2 and Appendix 3. BLM policy requires that the outstandingly remarkable values, tentative classification, and free-flowing nature of eligible river segments be protected on a case-by-case basis until a suitability determination is made. For rivers designated as suitable as a result of this planning effort, protections for wild and scenic values will continue, and the decisions in the RMP will support such protection. Rivers designated as not suitable will not be managed for wild and scenic purposes, but rather in conjunction with other decisions in the RMP.

Table 3-29. Eligible Wild and Scenic Rivers

River or River Segment	Outstandingly Remarkable Value(s)	Tentative Classification	BLM Miles
Dirty Devil River	Scenic, recreational, geologic, fish and wildlife, cultural	Wild	54
Beaver Wash Canyon	Scenic, ecological	Wild	6.8
Larry Canyon	Scenic, recreational, wildlife, ecological	Wild	4
No Mans Canyon	Scenic, recreational, cultural	Wild	7.1
Robbers Roost Canyon	Scenic, recreational, historic, cultural	Wild	31
Sams Mesa Box Canyon	Scenic and wildlife	Wild	9.5
Twin Corral Box	Scenic and wildlife	Wild	9
Fish Creek	Cultural	Scenic	.25
Fremont River—Fremont Gorge	Scenic	Wild	5
Fremont River—Capitol Reef NP to Caineville Diversion	Scenic and geologic	Recreational	4
Maidenwater Creek	Scenic, recreational, geologic, wildlife, ecological	Scenic	3
Quitcupah Creek	Cultural	Recreational	1.4
Total BLM Miles:			135.05

3.5.3 Areas of Critical Environmental Concern (ACECs)

FLPMA defines an ACEC as an area "within the public lands where special management attention is required to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources, or other natural systems or processes, or to protect life and safety from natural hazards." (43 CFR 1601.0-5 (a)). Private lands and lands administered by other agencies are not included in the boundaries of ACECs.

FLPMA states that the BLM will give priority to the designation and protection of ACECs in the development and revision of land use plans. ACECs differ from some other special designations in that designation by itself does not automatically prohibit or restrict other uses in the area. The special management attention is designed specifically for the relevant and important values, and therefore varies from area to area. The one exception is that a mining plan of operation is required for any proposed mining activity that would create surface disturbance greater than casual use within a designated ACEC (per the regulations at 43 CFR 3809).

To qualify as a potential ACEC, both relevance and importance criteria outlined in 43 CFR 1610.7-2 must be met. These criteria are defined as:

- **Relevance:** Presence of a significant historic, cultural, or scenic value; a fish or wildlife resource or other natural system or process; or a natural hazard.
- **Importance:** The value, resource, system, process, or hazard must have substantial significance and value. This generally requires qualities of more than local significance and special worth, consequence, meaning, distinctiveness, or cause for concern.

3.5.3.1 Existing Areas of Critical Environmental Concern

There are currently four ACECs in the RFO. These ACECs, and their relevant and important values, are listed in Table 3-30. Refer to Map 3-16 for their locations.

Table 3-30. Existing Areas of Critical Environmental Concern

Area	Acreage	County	Relevant and Important Values
North Caineville Mesa ACEC	2,200	Wayne	Relict vegetation
South Caineville Mesa ACEC	4,100	Wayne	Relict vegetation
Gilbert Badlands Research Natural Area ACEC	3,680	Wayne	Natural systems or processes—badlands
Beaver Wash Canyon ACEC	4,800	Wayne	Natural processes, riparian
Total Acreage:	14,780		

3.5.3.1.1 North Caineville Mesa ACEC (2,200 acres)

The North Caineville Mesa ACEC was designated as an ACEC to protect the relict vegetation that is found on the top of the mesa. The ACEC is located north of Highway 24, about 12 miles west of Hanksville. It was designated in the 1982 Henry Mountain Management Framework Plan. Current management for this ACEC includes the following:

- closed to OHV use
- unavailable to livestock grazing
- open to leasing for oil and gas with major constraints (no surface occupancy).

3.5.3.1.2 South Caineville Mesa ACEC (4,100 acres)

The South Caineville Mesa ACEC was designated as an ACEC to protect the relict vegetation that is found on top of the mesa, as well as the historic resources that include a circa 1920 bilevel stone cabin associated with early area sheep and goat grazing. South Caineville Mesa is located south of Highway 24, about 12 miles west of Hanksville. It was designated as an ACEC in the 1982 Henry Mountain MFP. Located entirely within the Mount Ellen/Blue Hills WSA, the South Caineville Mesa ACEC is subject to management under the Interim Management Policy for Lands under Wilderness Review (BLM H-8550-1). Current management for this ACEC includes the following:

- closed to OHV use
- unavailable for livestock grazing
- closed to leasing for oil and gas

3.5.3.1.3 Gilbert Badlands Research Natural Area (RNA) ACEC (3,680 acres)

The Gilbert Badlands Research Natural Area ACEC was designated in 1987 to protect the scientific and educational (research) values of the geomorphology found in the Gilbert Badlands. Located in Wayne County south of Highway 24, the Gilbert Badlands are about 15 miles west of Hanksville. Located

entirely within the Mount Ellen/Blue Hills WSA, the Gilbert Badlands ACEC is subject to management under the IMP. Current management for this ACEC includes the following:

- closed to OHV use
- closed to leasing for oil and gas
- recommended for withdrawal from mineral entry
- no surface disturbing activities
- acquire inholdings within the ACEC boundary

3.5.3.1.4 Beaver Wash Canyon ACEC (4,800 acres)

Beaver Wash Canyon contains a unique area identified as a cold riparian ecosystem located in an otherwise desert environment. In 1982, it was noted of Beaver Wash Canyon that, “special management is needed to prevent irreparable damage to the ecological refugia (e.g., an isolated habitat that has preserved suitable environmental conditions for those species adapted to it and is unique in its ecological and geographical position in the region), which could be significantly impaired from certain surface disturbing activities” (BLM 1982). Beaver Wash Canyon is located on a tributary of the Dirty Devil River, east of Highway 95, and about 13 miles southeast of Hanksville. The majority of the Beaver Wash Canyon ACEC (99%) is located within the Dirty Devil WSA, and is subject to management under the IMP. Current management for this ACEC includes the following:

- closed to OHV use
- unavailable for grazing
- closed to oil and gas leasing
- recommended for withdrawal from mineral entry
- acquire inholdings within the ACEC boundary

3.5.3.2 Potential Areas of Critical Environmental Concern

During scoping for the Richfield RMP, the public nominated 30 areas to be designated as ACECs. Four of these areas were primarily within the Price Field Office (with small acreages within the RFO) and were evaluated for relevance and importance by the Price Field Office. The remaining 26 areas, totaling 1.6 million acres, were evaluated for relevance and importance by the RFO staff as part of the planning process. Based on these evaluations, the RFO identified 16 areas totaling approximately 886,810 acres as potential ACECs (see Table 3-31 and Maps 2-43 and 2-44). Information concerning all 26 nominated areas, as well as their evaluations, is summarized in Appendix 1. More detailed information can be found in the *Evaluations of Areas of Critical Environmental Concern* report (2005) which is available for review in the RFO.

Table 3-31. Potential Areas of Critical Environmental Concern

Area	Acreage	County(ies)
Badlands Potential ACEC	88,900	Wayne
Bull Creek Archaeological District Potential ACEC	4,800	Wayne
Dirty Devil/North Wash Potential ACEC	205,300	Wayne and Garfield
Fremont Gorge/Cockscomb Potential ACEC	34,300	Wayne
Henry Mountains Potential ACEC	288,200	Wayne and Garfield
Horseshoe Canyon Potential ACEC	40,900	Wayne
Kingston Canyon Potential ACEC	22,100	Piute
Little Rockies Potential ACEC	49,200	Garfield

Area	Acreage	County(ies)
Lower Muddy Creek Potential ACEC	16,200	Wayne
Old Woman Front RNA Potential ACEC	330	Sevier
Parker Mountain Potential ACEC	107,900	Wayne
Quitichupah Potential ACEC	180	Sevier
Rainbow Hills Potential ACEC	4,000	Sevier
Sevier Canyon Potential ACEC	8,900	Piute and Sevier
Thousand Lake Bench Potential ACEC	500	Wayne
Special Status Species Potential ACEC	15,100	Wayne, Garfield and Sevier
Total Acreage:	886,810	

3.5.3.2.1 Badlands Potential ACEC (Includes North and South Caineville Mesas and Gilbert Badlands Existing ACECs) (88,900 acres)

Purpose: The purpose of the Badlands Potential ACEC is to recognize and provide special management for relevant and important scenic, special status plant, natural processes (wind erosion), and riparian and relict vegetation values.

Description: The potential ACEC is located in central Wayne County, east of Capitol Reef National Park, north and south of State Highway 24. Notable geographic features include North Caineville Mesa, South Caineville Mesa, Factory Butte, and the surrounding Mancos Shale badlands. Portions of the Badlands potential ACEC are within the Mt. Ellen/Blue Hills WSA and, as such, are subject to management under the IMP.

Area: The potential ACEC is defined by Class A Scenery, and the badlands formations and relict vegetation areas within the nominated and existing ACECs named above. The potential ACEC contains additional acreage from that of the existing ACECs and overlaps the northern portion of the Mount Ellen/Blue Hills WSA.

3.5.3.2.2 Bull Creek Archaeological District Potential ACEC (4,800 acres)

Purpose: The purpose of the Bull Creek Archaeological District Potential ACEC is to recognize and protect the relevant and important archaeological values in the area.

Description: The Bull Creek Archaeological District is located along Bull Creek in the foothills of the Henry Mountains, directly south of Hanksville. It was listed on the National Register of Historic Places in 1981.

Area: The potential ACEC boundary is coincident with the Bull Creek Archaeological District boundary for which the relevant and important archaeological values were identified.

3.5.3.2.3 Dirty Devil/North Wash Potential ACEC (includes existing Beaver Wash Canyon ACEC) (205,300 acres)

Purpose: The purpose of the Dirty Devil/North Wash Potential ACEC is to recognize and provide special management for relevant and important scenic, cultural, paleontological, wildlife, and special status species values.

Description: The Dirty Devil River and side canyons are located southeast of Hanksville in Wayne and Garfield counties.

Area: The potential ACEC is defined by Class A Scenery, Mexican spotted owl suitable habitat, and desert bighorn crucial yearlong habitat within the nominated areas. The potential ACEC includes the existing Beaver Wash Canyon ACEC. The potential ACEC overlaps portions of the Dirty Devil, French Spring/Happy Canyon, and Fiddler Butte WSAs; thus management would be governed by the IMP for these areas. The Dirty Devil River and several of its side canyons were determined to be eligible as wild and scenic rivers.

3.5.3.2.4 Fremont Gorge/Cockscomb Potential ACEC (34,300 acres)

Purpose: The purpose of the Fremont Gorge/Cockscomb Potential ACEC is to recognize and provide special management for relevant and important cultural, scenic, riparian, plant, and wildlife resources. Relevant and important values were determined by evaluating the Fish Creek Cove/Cockscomb, Fremont Gorge/Miners Mountain, and Fremont Gateway nominated ACECs.

Description: The potential ACEC is located on public lands east of the Red Gate and west of Capitol Reef National Park in the Torrey-Teasdale-Grover area of central Wayne County.

Area: The potential ACEC is defined by mule deer crucial habitat within the boundary of the three nominated ACECs. The potential ACEC contains the entire Fremont Gorge WSA, which is subject to management under the IMP. The potential ACEC also contains the Fremont River in Fremont Gorge, identified by the BLM as an eligible wild and scenic river.

3.5.3.2.5 Henry Mountains Potential ACEC (288,200 acres)

Purpose: The purpose of the Henry Mountains Potential ACEC is to recognize and provide special management for relevant and important scenic, wildlife (bison and deer), special status species (Townsend's big-eared bat, ferruginous hawk, burrowing owl, hole-in-the-rock prairie clover), and ecological values. The No Man's Mesa portion of the ACEC would be designated as a Research Natural Area.

Description: Discovered by the Powell Expedition in the 1870s, the Henry Mountains, south of Hanksville, tower over the surrounding desert country.

Area: The potential ACEC is defined by crucial bison habitat, crucial mule deer habitat, and Class A Scenery. Other relevant and important values are included within this boundary. The potential ACEC includes portions of the following nominated ACECs: Bull Creek/Birch Creek, Bullfrog Creek, Granite Creek, Mount Hillers, No Man's Mesa, Ragged Mountain/Slate Creek, and Upper Sweetwater/Tarantula Mesa. The potential ACEC also overlaps all or parts of four WSAs: Mount Hillers, Mount Pennell, Bull Mountain, and Mount Ellen/Blue Hills; management of these lands would be governed by the IMP.

3.5.3.2.6 Horseshoe Canyon Potential ACEC (40,900 acres)

Purpose: The purpose of the Horseshoe Canyon Potential ACEC is to recognize and provide special management for relevant and important scenic and cultural values, notably Cowboy Cave. Other relevant and important values include riparian corridors and Townsend's big-eared bat.

Description: Horseshoe Canyon is a tributary of the Green River in northeastern Wayne County and is noted for its rock art. Part of the canyon is included within Canyonlands National Park.

Area: The Horseshoe Canyon Potential ACEC is defined by the Class A Scenery within the nominated area. Cultural, riparian, and special status species values are included within this boundary. The potential

ACEC overlaps portions of the Horseshoe Canyon North and Horseshoe Canyon South WSAs, which would be governed by the IMP.

3.5.3.2.7 Kingston Canyon Potential ACEC (22,100 acres)

Purpose: The purpose of the Kingston Canyon potential ACEC is to recognize and provide special management for relevant and important riparian and mule deer habitat in the area.

Description: The potential ACEC encompasses the canyon north and south of the Sevier River between the towns of Kingston and Antimony in Sevier County.

Area: The potential ACEC is defined by the mule deer habitat within the nominated ACEC. The riparian area is included in the mule deer habitat boundary. (**Note:** The riparian area is largely in state and private ownership.)

3.5.3.2.8 Little Rockies Potential ACEC (49,200 acres)

Purpose: The purpose of the Little Rockies Potential ACEC is to recognize and provide special management for scenic and wildlife values, notably desert bighorn sheep. Other relevant and important values within the ACEC include Townsend's big-eared bat, hole-in-the-rock prairie clover, and ecologic values.

Description: The potential ACEC is located in the southwest corner of Garfield County, north of Ticaboo. It overlaps the entire Little Rockies National Natural Landmark and most of the Little Rockies WSA, which would be governed by the IMP.

Area: Class A Scenery defines the ACEC boundary.

3.5.3.2.9 Lower Muddy Creek Potential ACEC (16,200 acres)

Purpose: The purpose of the Lower Muddy Creek Potential ACEC is to recognize and provide special management for the relevant and important scenic, riparian, and special status plant values in the area.

Description: The potential ACEC is located along Lower Muddy Creek in north-central Wayne County and south-central Emery County.

Area: Class A Scenery defines the ACEC boundary.

3.5.3.2.10 Old Woman Front Research Natural Area Potential ACEC (330 acres)

Purpose: The purpose of the Old Woman Front Research Natural Area Potential ACEC is to recognize and protect the relevant and important relict vegetation in the area. This Research Natural Area ACEC would complement the existing National Forest RNA.

Description: The potential ACEC is located in eastern Sevier County adjacent to the Fishlake National Forest.

Area: The potential ACEC is on public land adjacent to the Forest Service Old Woman Cove RNA in the Fishlake National Forest.

3.5.3.2.11 Parker Mountain Potential ACEC (107,900 acres)

Purpose: The purpose of the Parker Mountain Potential ACEC is to recognize and provide special management for sagebrush-steppe habitat and wildlife values, notably the greater sage grouse, Utah prairie dog, and pygmy rabbit.

Description: Parker Mountain, also known as the Awapa Plateau, is located in western Wayne County, southwest of the town of Loa.

Area: The potential ACEC includes all of the area that was nominated by the public.

3.5.3.2.12 Quitchupah Potential ACEC (180 acres)

Purpose: The purpose of the Quitchupah Potential ACEC is to recognize and provide special management for relevant and important archaeological, and riparian values.

Description: Quitchupah Creek is located in western Sevier County. The creek flows off the Fishlake National Forest across public lands managed by the Richfield and Price BLM field offices.

Area: The potential ACEC boundary includes the riparian corridors and associated cultural resource sites and areas that have spiritual value to American Indians.

3.5.3.2.13 Rainbow Hills Potential ACEC (4,000 acres)

Purpose: The purpose of the Rainbow Hills Potential ACEC is to recognize and provide special management for relevant and important mule deer habitat, natural systems, and special status species values in the area.

Description: The Rainbow Hills are located just east of Richfield, in a colorful Arapien shale formation. The potential ACEC nomination includes the shale and other lands adjacent to it.

Area: The potential ACEC boundary is defined by the crucial mule deer range. The plant and natural system values are included within this boundary.

3.5.3.2.14 Sevier Canyon Potential ACEC (8,900 acres)

Purpose: The purpose of the Sevier Canyon Potential ACEC is to recognize and provide special management for relevant and important mule deer habitat, riparian, and special status species values in the area.

Description: Sevier Canyon (also known as Marysvale Canyon) is a gorge bordering the Sevier River between the towns of Sevier and Marysvale. Big Rock Candy Mountain (privately owned) is located in the canyon.

Area: The potential ACEC boundary is defined by the mule deer habitat and the riparian corridor on public land along the Sevier River. (**Note:** The riparian area is largely in private ownership.)

3.5.3.2.15 Thousand Lake Bench Potential ACEC (500 acres)

Purpose: The purpose of the Thousand Lake Bench Potential ACEC is to recognize and provide special management for relevant and important cultural resources, special status plants, and riparian areas.

Description: The potential ACEC is located in southeastern Sevier County, south of I-70 and east of Thousand Lake Mountain.

Area: The potential ACEC is defined by riparian areas and the locations of cultural resources and special status plants.

3.5.3.2.16 Special Status Species Potential ACEC (15,100 acres)

Purpose: The purpose of the Special Status Species Potential ACEC is to recognize and provide special management for isolated and scattered locations of specific plant and wildlife species identified in the evaluations of the various ACEC nominations as relevant and important and not included in other potential ACECs. Species include Winkler pincushion cactus, Wright fishhook cactus, last chance townsendia, rabbit valley gilia, Cronquist wild buckwheat, basalt milkvetch, hole-in-the-rock prairie clover, Psoralea globemallow, Jane's globemallow, Townsend's big-eared bat, Allen's big-eared bat, big free-tailed bat, fringed myotis, ferruginous hawk, bald eagle, burrowing owl, long-billed curlew, southwestern willow flycatcher, greater sage grouse, bluehead sucker, flannelmouth sucker, leatherside chub, and desert night lizard.

Description: See "Purpose" above.

Area: The Special Status and Endemic Species ACEC is represented by documented locations of the above-listed species. In contrast with the other potential ACECs, this ACEC is composed of many small, discrete areas rather than a large contiguous area.

3.6 SOCIAL AND ECONOMIC CONDITIONS

The socioeconomic study area includes all of four counties (Piute, Sanpete, Sevier and Wayne) and the eastern portion of Garfield County. (As stated previously, there are also 21,500 acres of Kane County within the RMP planning area. However, since those lands lie entirely within Glen Canyon National Recreation Area and no decisions within this RMP will affect those lands, Kane County is not included within the socioeconomic study area.) This section summarizes demographic and economic trend information, including descriptions of the key industries in the five county socioeconomic study area that could be affected by BLM management actions. Study area industries most affected by BLM land management policies and programs are (1) production agriculture, in particular cattle grazing and production, (2) mining and oil and gas production, and (3) travel, tourism, and recreation. BLM lands provide areas for activities such as hunting and fishing, hiking, camping or picnicking, traditional natural resource uses (e.g., firewood or pine-nut gathering), and sightseeing.

Although some resources managed by the RFO may be of regional or national interest, this EIS assumes that RFO management decisions primarily affect the economies of the counties and towns within the five counties encompassed by the planning area boundary. This section presents baseline information used to help analyze the socioeconomic impacts of the alternatives considered in this EIS. More detailed information is provided in the Baseline Socioeconomic Profile (BLM 2003b). This section refers to numerous figures and tables from the baseline profile.

3.6.1 Social Background

The Baseline Socioeconomic Profile (BLM 2003b) discusses characteristics of the study area in some detail. The five counties in the study area are predominantly rural, with large land areas and dispersed populations. The number of persons per square mile ranges from 0.9 in Garfield County to 14.3 in Sanpete County, well below state and national averages.

At least half of the lands in each county within the socioeconomic study area are publicly-owned and Federally-managed. As shown in Table 3-32, the socioeconomic study area comprises more than 80% Federally-managed land, with 12.5% in private ownership. Lands managed by the RFO total 2.1 million acres, about 39% of the planning area.

Table 3-32. Land Ownership in the Socioeconomic Study Area

Area	Total Population (2000 Census)	Land Area (Sq. Miles)	Persons Per Square Mile	Federally Owned Land	Privately Owned Land
Garfield County	4,735	5,176	0.9	90.0%	5.1%
Piute County	1,435	757	1.9	74.3%	12.7%
Sanpete County	22,763	1,598	14.2	51.7%	42.5%
Sevier County	18,842	1,910	9.9	76.0%	19.1%
Wayne County	2,509	2,464	1.0	85.6%	3.5%
Socioeconomic Study Area	50,284	11,905	4.2	80.7%	12.5%
Utah	2,193,000	84,583	25.9	63.9%	21.6%

Note: The Garfield County figures include all land in the socioeconomic study area, not just land in the field office study area.
Source: Utah Division of Travel Development 2004; U.S. Census Bureau 2004.

The socioeconomic study area has sustained human populations for thousands of years. The people of this region, dating back to the Ute, Paiute, Navajo, and Hopi tribes, and even earlier civilizations such as the Fremont and ancestral Puebloan peoples, maintained very close connections to the land. As these native people lived in or moved through the area, the area's plants and animals provided them with food, medicine, and clothing.

European settlement began in 1849 with the establishment of Manti in Sanpete County. Settlement expanded throughout the area over the next 30 years, with Hanksville in eastern Wayne County being settled in 1882. Settlers supported themselves by irrigating the valleys, running livestock on the rangelands, and to a lesser extent, mining and lumbering. Settlements were closely tied to locations where water was available for farming and forage available for livestock. The Sevier-Sanpete Valley proved fertile land for farm production, whereas the areas around Parker Mountain and Monroe Mountain and extending through Capitol Reef National Park into the Henry Mountains were utilized for grazing livestock. Some of the current livestock permittees are heirs of families who have grazed stock on the public land for generations.

As early pioneers labored to make a living with agricultural products, prospectors were busy exploring the mountains of the area in search of metals and minerals that could be sold for a profit. Specifically, what is now Piute County supported a rich mining boom in the late 1800s. With industrialization and mechanization of agriculture, many of the initial pioneer settlements in the region matured. Throughout the 20th century, the roots of the natural resource-related industries and the persons associated with them became well established in the area. Although today few families earn their livelihoods solely from these basic industries, agriculture and to a lesser extent mining are still an integral part of the social structure of the area. Over time, the connection to public lands has changed from economic to social and traditional. The historical uses of public lands that continue today include hunting, wood gathering, pine-nut collecting, family picnics and other family gatherings, wildlife viewing, Christmas tree cutting, and other traditional activities. These uses provide opportunities for socialization within and between families and other social groups. Large population centers resulting from industrialization and urbanization have heightened social regard for areas without much human development. The socioeconomic study area

provides several opportunities for such areas. Use of these areas for outdoor recreation activities has increased over the past 20 years. Major recreational resources in the area, such as the Paiute and Great Western Trails, hiking and canyoneering opportunities in the Dirty Devil region, and bison viewing and hunting in the Henry Mountains attract many people each year to the region. Hunting and fishing opportunities in the socioeconomic study area and in the nearby Fishlake and Manti-LaSal National Forests complement camping, wildlife viewing, and other recreational activities, as people look for a break from the urban life. Residents in the socioeconomic study area understand and enjoy the lifestyle that comes with living in the area. The recreation component has created yet another connection to the public lands that is important not only to local residents but also to those who come from other areas in Utah, other states, and other countries to enjoy these natural resources.

3.6.1.1 County Perspectives

The following statements, taken from county plans, represent county perspectives on the management of public lands occurring in the five-county area. County plans are summarized in Appendix 13.

Garfield County: “The county deems it critical that Resource Management Plans provide for range improvements, that current grazing on public lands be preserved, that county water rights be maintained, that public lands timber harvesting be continued, and that mining leases be considered and encouraged” (Garfield County 1998).

Piute County: “It is in the county’s best interest that BLM and USFS lands be managed for multiple use and that access is maintained on public lands” (Piute County 1994).

Sanpete County: “The culture and sentiment of Sanpete County residents is such that they...will want input on the management and use of public lands in the county” (Sanpete County 1997).

Sevier County: “Multiple use activities on public lands in Sevier County should continue and should include uses such as agricultural grazing, fishing and hunting, mineral exploration and mining, recreation, wildlife habitat, and timber sales”(Sevier County 1998).

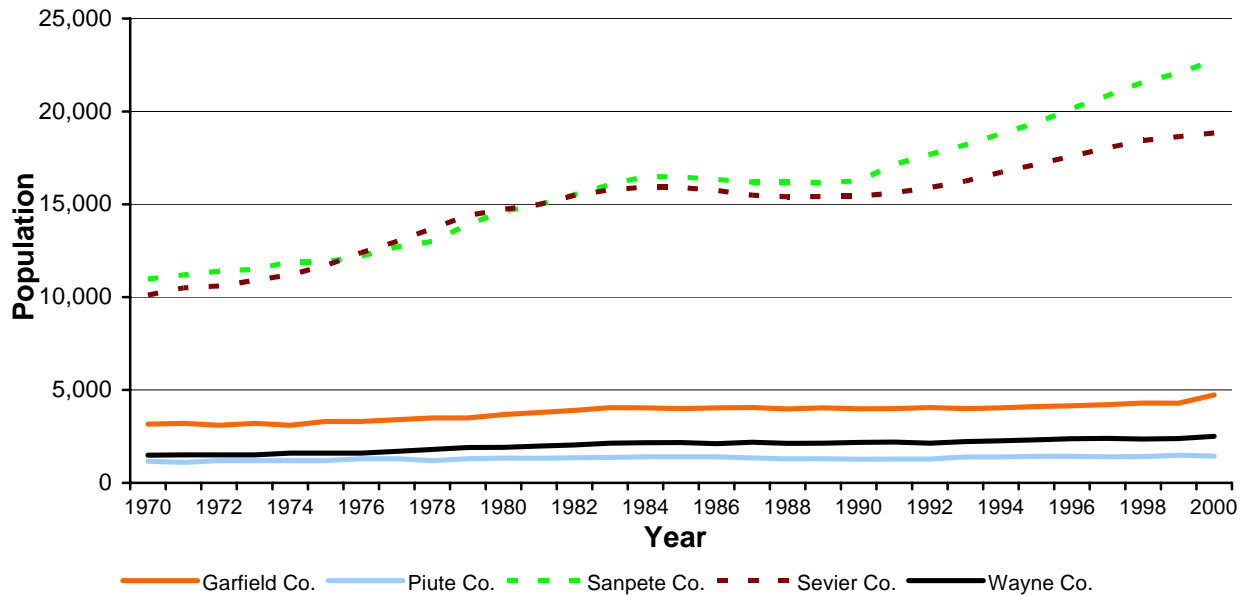
Wayne County: “It is the county’s desire that each resource be managed for the optimal economic return, but in ways which do not sacrifice the county’s natural aesthetic values” (Wayne County 1994).

3.6.1.2 Population

Approximately 85% of the people residing in the socioeconomic study area live in Sanpete and Sevier counties. In contrast, the eastern portion of the socioeconomic study area is very sparsely populated because of its isolation, aridity, and ruggedness.

Population trends for the five counties are plotted in Figure 3-5. Population growth in the five counties is on an upward trend, although Garfield, Piute, and Wayne counties are growing at a very slow rate. The higher growth rates of Sanpete and Sevier counties have been sustained by increased business opportunities following the construction of Interstate 70, construction of an annex of the Utah State Prison, and expansion of other business related to retail trade.

Figure 3-5. Population Estimates, 1970–2000



Source: BLM 2003b.

The population of the socioeconomic study area increased by almost 8% during the 1980s and grew by 24.9% in the 1990s. Population growth in the socioeconomic study area lagged significantly behind the state's population growth during the 1980s but outpaced the state's growth during the 1990s (BLM 2003b). The 1980s were marked by a 6.5% decline in net migration (e.g., the net result of persons moving in and out of the area). However the 1990s showed a marked change in this trend. Net migration increased in the socioeconomic study area by nearly 16%. These trends are similar to the statewide pattern during both the 1980s and 1990s, with the socioeconomic study area doubling the statewide trends (BLM 2003b).

3.6.2 General Economic Characteristics

All of the counties within the socioeconomic study area as well as the entire state showed large increases in the civilian labor force throughout the 1990s. Only Sevier and Garfield counties had percentage increases lower than the State of Utah as a whole and their increases were more than 20% and nearly 19%, respectively. The nine-year average annual increase in the civilian labor force for the socioeconomic study area was 2.53%, slightly higher than the State's 2.49% average. The increases varied within the socioeconomic study area, from a 2.1% annual increase in Garfield County to a 3.75% increase in Wayne County (BLM 2003b).

Total employment in the socioeconomic study area increased more than 50% over the last decade, from 17,202 jobs in 1990 to 25,876 jobs in 2000. This growth rate exceeded the national rate but lagged behind the Utah growth rate.

Throughout the 1990s unemployment in the socioeconomic study area showed a downward though sometimes unsettled trend. Except for 1993, when the national and socioeconomic study area rates were the same, the unemployment rate for the socioeconomic study area was higher than the national and state rates. All trends show a reversal between 2000 and 2001, with marked increases in the unemployment

rate. The yearly average unemployment rate for the years 1990-2001 is 7% for the socioeconomic study area, 5.5% for the nation, and 3.9% for the State of Utah (BLM 2003b).

Total personal income for the socioeconomic study area well exceeded \$844 million for 2000, an increase of more than \$254 million since 1990. This represents a total growth in real (inflation-adjusted) personal income of more than 43% in 10 years (BLM 2003b).

The socioeconomic study area has shown minor changes in how income is earned. Labor income (e.g., wages, salaries, and self-employment income) during 2000 was 63.6% of total personal income, whereas investment income was 17.1%. These numbers represent small decreases over the last two decades. During the same period, transfer payment income (largely derived from Social Security or other retirement benefits, Medicare and Medicaid benefits, and other income support and assistance) has absorbed the decreases in investment and labor income, growing from 14.6% of total personal income in 1980 to 17.5% in 1990 and 19.3% in 2000 (BLM 2003b). These trends are similar to state and national trends.

Per capita income (in 2002 dollars) in the socioeconomic study area has increased at a much slower rate than statewide per capita income, resulting in an increasingly large disparity between socioeconomic study area and state income levels. In 1990 socioeconomic study area per capita income was 79.3% of the per capita income throughout the state. That percentage decreased to 70% of state per capita income in 2000. In 2000, the socioeconomic study area per capita income was \$16,793, significantly below the national figure (\$30,150) and state figure (\$23,977).

All five counties had a higher poverty rate (percentage of individuals living in households with an income below thresholds defined by the U.S. Census Bureau) than state or national rates in 1989, but in 1999, Sevier County and Garfield County each had a lower poverty rate than the United States. The percentage of individuals within the socioeconomic study area living below the poverty level declined from 17% in 1989 to 13% in 1999 (BLM 2003b).

3.6.2.1 Employment and Earnings by Industry

Rural areas like the socioeconomic study area are often more dependent on traditional natural resource-based industries, such as mining and agriculture. For example, the socioeconomic study area is more dependent on mining and agriculture jobs than the State of Utah as a whole. Mining and farm employment made up just over 2% of Utah's total employment in 2000, whereas those same industries provided for just over 11% of jobs in the socioeconomic study area. Mining and agriculture are also important as an economic base for the socioeconomic study area because they export their goods outside the region and in turn support ancillary industries such as retail trade, construction, and services (BLM 2003b).

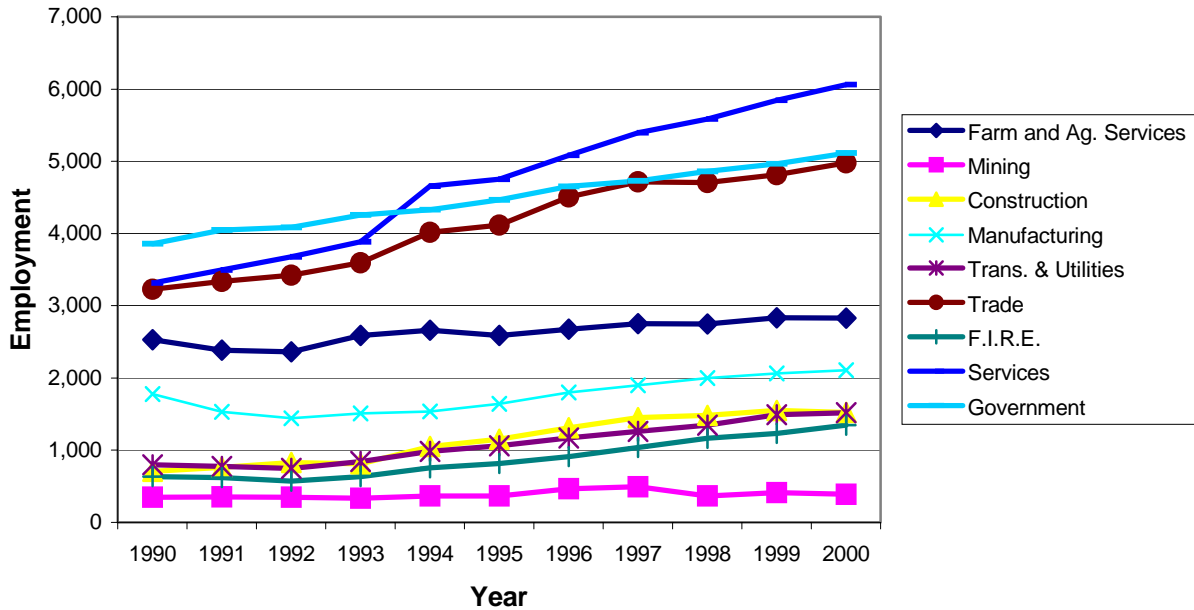
Services, government, and retail trade comprised more than 60% of employment in the socioeconomic study area in 2000 (BLM 2003b). Figure 3-6 shows the trends in employment by industry during the last decade. Industries showing the greatest numerical increase in employment from 1990–2000 included services (2,744 new jobs), trade (1,751 new jobs), government (1,253 new jobs), and construction (815 new jobs). Industries reporting the slowest growth in the socioeconomic study area included farm and agricultural services and mining, both increasing by 12% over the last decade. Transportation and utilities; construction; and finance, insurance, and real estate (F.I.R.E.) showed significant growth but accounted for relatively small percentages of total employment.

Mining, transportation, and utilities continue to provide the highest-paying jobs in the socioeconomic study area, though both industries have experienced a decline in average real earnings per job over the last

decade, as shown in Figure 3-7. The government and manufacturing sectors have shown growth in average real earnings per job and now provide the third and fourth highest paying jobs in the area. Farm and agricultural services, trade, and F.I.R.E. reported the lowest earnings per job throughout much of the latter part of the 1990s. Agriculture and mining showed the most volatility in average earnings per job over the course of the decade.

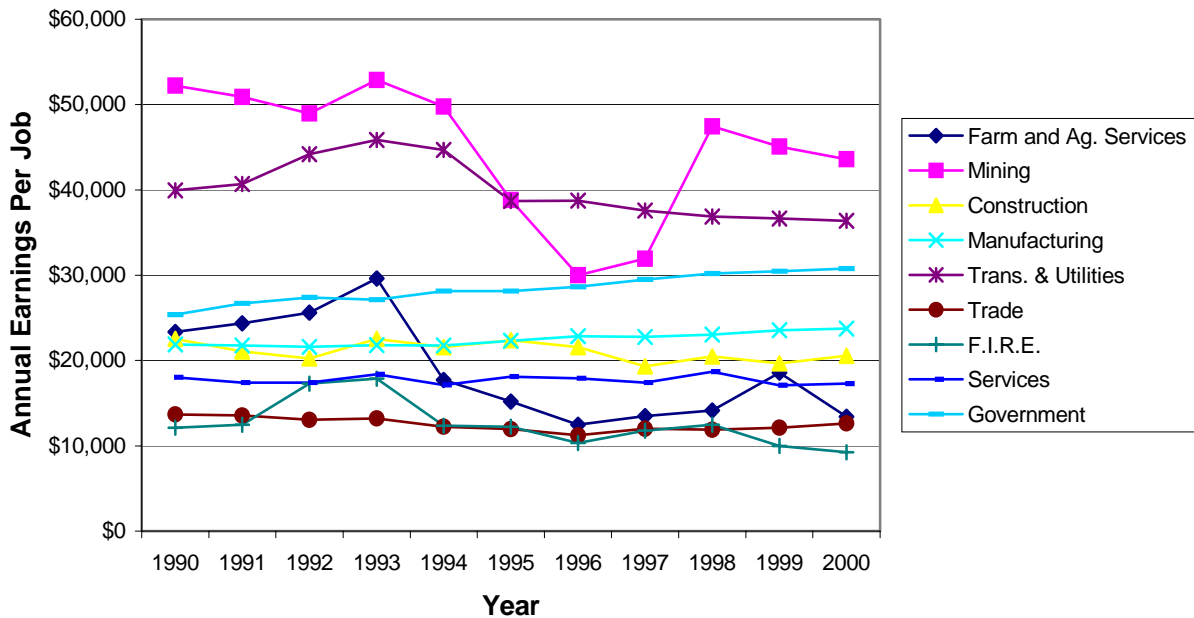
Gross real earnings for all socioeconomic study area industries grew by more than 40% from 1990 to 2000. Earnings from government jobs have consistently been higher than all other industries, totaling more than \$157 million in 2000 and accounting for nearly 29% of all earnings. The service sector has become an integral part of the economy, growing from \$59 million and 16% of total earnings in 1990 to \$104 million and 21% of total earnings in 2000. After growing sharply (207%) in the 1980s, earnings from jobs in the farm sector dipped (by 36%) in the 1990s. The farm sector accounted for \$38 million and 7.2% of total socioeconomic study area earnings in 2000. Mining also reported a decline in real earnings during the last decade, falling by 6%, from \$18 million in 1990 to \$17 million (3.1% of total earnings) in 2000 (BLM 2003b).

Figure 3-6. Trends in Full-Time and Part-Time Employment by Industry, 1990–2000



Source: BLM 2003b.

Figure 3-7. Average Earnings Per Job (2002\$)



Source: BLM 2003b.

3.6.2.2 Government Revenue from Natural Resources

3.6.2.2.1 Revenues to the Federal Government

The Federal government's Minerals Management Service (MMS) collects royalties and rents from leases of Federal lands for production of coal, oil, gas, and other leasable minerals. For coal leases issued or readjusted after August 4, 1976, the royalty rate is 8% of the value of production for underground mines and 12.5% for surface mines. However, there are no surface coal mines in the planning area at this time. Coal leases are offered competitively with a bonus bid in either dollars-per-acre or cents-per-ton; the minimum bid is \$100.00 per acre or its equivalent in cents-per-ton. Annual rents on a coal lease are \$3.00 per acre. For oil and gas leases issued after December 22, 1987, royalties are 12.5% of the amount or value of production. Oil and gas leases are offered competitively with a minimum bonus bid of \$2.00 per acre. The rents for an oil and gas lease are \$1.50 per acre for the first five years and \$2.00 per acre for subsequent years. Royalties, bid prices, and rents are collectively referred to as lease revenue. Leases for non-energy solid leasable minerals are also subject to royalties, competitive bidding as required by regulation, and rents, but at this time, there are no non-energy solid leases in the planning area.

Revenues, collected as royalties, rents, and bonus bids on a Federal lease, are distributed within the Federal government and to the State of origin of the revenue. The Federal government returns 50% of the lease revenues to the State of origin of the revenues, and the other 50% is variously distributed within the Federal government, depending on the type of lease, which varies depending on when the lease was issued. In Utah the revenues distributed to the State flow through the Utah Department of Community and Economic Development to various state funds and other state and local agencies.

The Federal government also receives bonus bid revenue from minerals underlying former Federal lands exchanged with the State of Utah's School and Institutional Trust Lands Administration as part of the Utah School and Lands Exchange Act of 1998 (Public Law 105-335). Only two counties in the state, Carbon and Emery, produce significant mineral lease revenue from exchanged lands. In the socioeconomic study area, only Sevier County has produced any such revenue in fiscal years 2000 through 2004: a total of \$500.00 in FY 2000. Because this was lease revenue and not bonus bid revenue, all of this revenue went to SITLA (none to the Federal government).

Table 3-33 provides figures on a county basis for mineral revenue collections by MMS and subsequent disbursements to the state. These figures encompass all Federal lands in the included counties. Tracing revenues and disbursements to BLM lands in particular was not feasible for this study. Most of the revenue in Table 3-33 is generated in Sevier County as a result of coal production.

The RFO collects fees and other revenues for a variety of uses on BLM lands. These revenue sources include right-of-way rents, recreation fees, mineral material and vegetative material permit fees, and grazing fees. Table 3-34 provides figures for the most significant local BLM revenue sources for fiscal years 2002 to 2004. The table also indicates how each type of revenue is distributed. Revenue from sales of land and materials, along with right-of-way rents, mostly leave the RFO. Recreation fees are retained. Fifty percent of grazing fees go to the BLM Range Improvement Fund and are returned to the district of origin.

Table 3-33. Mineral Lease and Bonus Revenues Collected and Disbursed by the Federal Government, State of Utah Fiscal Years 2001–2004

State Fiscal Year and Collections/Disbursements	Garfield County	Piute County	Sanpete County	Sevier County	Wayne County	Study Area Total	State Total
2001							
Federal Mineral Lease Collections	\$798,451	\$2,290	\$106,725	\$10,467,631	\$17,779	\$11,392,876	\$92,368,329
Federal Mineral Bonus Collections	\$0	\$0	\$0	\$3,203,946	\$0	\$3,203,946	\$6,723,764
Total Federal Collections	\$798,451	\$2,290	\$106,725	\$13,671,577	\$17,779	\$14,596,822	\$99,130,862
Total Disbursed to State	\$399,226	\$1,145	\$53,362	\$6,835,788	\$8,890	\$7,298,411	\$49,565,431
2002							
Federal Mineral Lease Collections	\$241,975	\$2,345	\$39,163	\$4,350,638	\$1,431	\$4,635,553	\$27,021,330
Federal Mineral Bonus Collections	\$0	\$0	\$0	\$3,203,946	\$0	\$3,203,946	\$3,526,947
Total Federal Collections	\$241,975	\$2,345	\$39,163	\$7,554,584	\$1,431	\$7,839,499	\$30,548,276
Total Disbursed to State	\$120,988	\$1,173	\$19,581	\$3,777,292	\$716	\$3,919,749	\$15,274,138
2003							
Federal Mineral Lease Collections	\$526,921	\$2,371	\$3,746	\$10,121,739	\$0	\$10,654,777	\$63,953,116
Federal Mineral Bonus Collections	\$111,054	\$0	\$163,070	\$3,447,920	\$1,431	\$3,723,475	\$15,767,107
Total Federal Collections	\$637,975	\$2,371	\$166,816	\$13,569,660	\$1,431	\$14,378,252	\$79,720,223
Total Disbursed to State	\$318,988	\$1,185	\$83,408	\$6,784,830	\$716	\$7,189,126	\$39,860,112
2004							
Federal Mineral Lease Collections	\$576,836	\$2,436	\$1,552	\$8,375,727	\$0	\$8,956,551	\$115,121,675
Federal Mineral Bonus Collections	\$27,845	\$0	\$297,448	\$3,621,065	\$1,908	\$3,948,266	\$19,310,291
Total Federal Collections	\$604,681	\$2,436	\$299,001	\$11,996,792	\$1,908	\$12,904,817	\$134,431,966
Total Disbursed to State	\$302,340	\$1,218	\$149,500	\$5,998,396	\$954	\$6,452,409	\$67,215,983

Note: All figures are rounded to the nearest dollar.

Source: Utah Division of Housing and Community Development (2004). State receipts data grossed-up to Federal collections based on 50-50 state-Federal split (U.S. Minerals Management Service 2004b).

Table 3-34. Richfield Field Office Revenue Collections, Federal FY2002–FY2004, and Primary Distribution of Funds

Type of Revenue	Data Source	2002	2003	2004	Distribution (3)
Right-of-way and communication site annual rents	1	\$71,693	\$71,203	\$61,648	To national BLM account and Federal Treasury general fund
Commercial/group Special Recreation Permits; campground fees	2	\$207,394	\$99,964	\$109,833	Retained by BLM (Recreation Fee Demo Program)
Little Sahara recreation site entrance fees	1	\$5,089	\$0	\$0	Retained by BLM (Recreation Fee Demo Program)
Mineral material permit fees (sand and gravel, stone, soil, and other)	1	\$8,725	\$21,599	\$14,036	76% to U.S. Bureau of Reclamation's Reclamation Fund, 20% to Federal Treasury General Fund, 4% to state
Vegetative material permit fees (native seed collection, firewood, posts/poles, Christmas trees, other)	2	\$10,633	\$3,767	\$3,476	76% to U.S. Bureau of Reclamation's Reclamation Fund, 20% to Federal Treasury General Fund, 4% to state
Sale of public land	1	\$0	\$167,440	\$0	76% to U.S. Bureau of Reclamation's Reclamation Fund, 20% to Federal Treasury General Fund, 4% to state
Grazing fees, related maintenance and trespass fees	1	\$87,826	\$41,360	\$68,019	50% to BLM Range Improvement Fund (returned to the district of origin), 37.5% to Federal Treasury General Fund, 12.5% to state
Right-of-way (primarily monitoring fees)	1	\$40,604	\$36,019	\$0	Retained by BLM
Road maintenance (vegetative materials)	1	\$6,323	\$1,566	\$1,397	Retained by BLM

Sources:

1 – Data provided by RFO accounting office, October 2004; figures are collections net of reversals and transfers.

2 – Figures provided by RFO resource specialists, October/November 2004.

3 – BLM National Business Center, Collections and Billing Branch, interviews November 2004 and "Distribution of Receipts Synopsis."

3.6.2.2.2 Revenues to State Government

As noted above, the Federal government, through the MMS, pays the State of Utah 50% of the mineral lease and bonus revenues it collects from Federal leases in the state. These disbursements are shown in Table 3-35. State exchange lands, as noted above, produce negligible revenue in the socioeconomic study area. Other lands in the socioeconomic study area administered by SITLA may produce mineral revenues, but because these lands are not managed by BLM, this data was not collected for this study.

The State of Utah collects several taxes and fees that derive from natural resources on both private lands and public lands:

- **Mining Severance Tax.** The tax is 2.6% of the taxable value of all metals or metalliferous minerals sold or otherwise disposed of (Utah Code 2004). Every person or business engaged in mining metals or metalliferous minerals must file an annual report with the Utah State Tax Commission. However the first \$50,000 of value is exempt from the tax.
- **Oil and Gas Severance Tax.** The tax is three or 5%, depending on the value at the well per barrel of oil or per million cubic feet of gas, and 4% for natural gas liquids, minus certain credits and reductions (Utah Code 2004). Statewide severance tax revenue totaled \$18,893,082 in FY 2002 and \$26,745,279 in FY 2003 (Utah State Tax Commission 2003). The state does not report this revenue on a county basis. However, production from the socioeconomic study area for FY 2000 to FY 2003 was entirely limited to Garfield County and averaged about 1.5% of state production for oil, and was considerably less than 0.001% for gas (UDOGM 2004). Thus, oil and gas severance tax revenue to the state from the socioeconomic study area has been negligible in recent years.
- **Coal Severance Tax.** Utah does not have a state severance tax on coal.
- **Oil and Gas Conservation Fee.** The fee is 0.2% of the value at the well (Utah Code 2004). Statewide conservation fee revenue totaled \$1,710,219 in FY 2002 and \$1,943,755 in FY 2003 (Utah State Tax Commission 2003). The state does not report this revenue on a county basis. Conservation fee revenue to the state from the five-county area has been negligible in recent years for the same reason noted for the severance tax.
- **Income Taxes.** There are various state income tax rates, depending on individual or corporate status, type of corporation, taxable income, and other factors. The state requires 5% withholding on most mineral production income (Utah Code 2004). State income tax revenue derived from income on natural resources in the five-county area is not reported on a county basis by the state and cannot be reliably estimated for this study.

3.6.2.2.3 Revenues to Local Governments

Much of the Federal and state mineral revenue is disbursed to local government. The major means for the disbursements are as follows:

- **UDOT.** Most of Utah's share of Federal land mineral lease revenue is deposited in the state Mineral Lease Account. In addition, 39.5% of state exchange land mineral lease revenue (minus 3% taken by SITLA for administration) is deposited in the Mineral Lease Account. Forty percent of the funds in the Mineral Lease Account are returned to the county of origin through UDOT in proportion to the amount generated by each county.
- **Community Impact Fund.** A total of 32.5% of the revenue in the Mineral Lease Account (plus a remainder after other funds are paid, if available) goes to this special fund set up by the legislature to award grants and loans to state and local agencies that are socially or economically impacted by mineral resource development. In addition, 12.16% of exchange lands bonus

revenue goes into the Community Impact Fund. The funds are awarded on a competitive basis and can be used for planning, construction, and maintenance of public facilities, and provision of public services.

- **Special Service Districts.** Five percent of the revenue in the Mineral Lease Account is distributed to 11 counties that are impacted by mineral extraction but receive limited funds through UDOT or the Community Impact Fund. These counties include four of the five counties in the planning area: Garfield, Piute, Sanpete, and Wayne. Each county receives an equal base payment and a portion based on population.

Table 3-35 shows these distributions of mineral lease and bonus revenues by county for recent years.

Table 3-35. Distribution of Mineral Revenues by County, State of Utah Fiscal Years 2001–2004

Data Source	Revenue Source	Garfield County	Piute County	Sanpete County	Sevier County	Wayne County	Study Area Total	State Totals
FY2001								
1	State Distribution to Counties - UDOT	\$219,434	\$458	\$21,138	\$2,073,944	\$3,556	\$2,318,530	\$20,609,660
2	State Distribution to Special Service Districts	\$168,349	\$132,727	\$374,995	\$0	\$143,686	\$819,757	\$2,476,644
3	State Distribution to Counties - Community Impact Fund	\$127,000	\$176,000	\$4,450,000	\$4,160,000	\$100,000	\$9,013,000	\$34,274,472
Sum of Above Distributions*		\$514,783	\$309,185	\$4,846,133	\$6,233,944	\$247,242	\$12,151,287	\$57,360,776
FY2002								
1	State Distribution to Counties - UDOT	\$138,518	\$0	\$13,797	\$1,779,957	\$902	\$1,933,174	\$11,120,386
2	State Distribution to Special Service Districts	\$99,391	\$76,910	\$222,204	\$0	\$84,227	\$482,732	\$1,476,957
3	State Distribution to Counties - Community Impact Fund	\$28,916	\$0	\$160,000	\$1,027,500	\$430,000	\$1,646,416	\$20,933,850
Sum of Above Distributions*		\$266,825	\$76,910	\$396,001	\$2,807,457	\$515,129	\$4,062,322	\$33,531,193
FY2003								
1	State Distribution to Counties - UDOT	\$154,878	\$615	\$1,324	\$1,614,650	\$0	\$1,771,467	\$16,221,449
2	State Distribution to Special Service Districts	\$136,263	\$105,442	\$304,637	\$0	\$115,473	\$661,815	\$2,024,878
3	State Distribution to Counties - Community Impact Fund	\$697,700	\$0	\$918,000	\$8,992,961	\$207,000	\$10,815,661	\$38,410,192
Sum of Above Distributions*		\$988,841	\$106,057	\$1,223,961	\$10,607,611	\$322,473	\$13,248,943	\$56,656,519
FY2004								
1	State Distribution to Counties - UDOT	\$148,853	\$486	\$309	\$1,672,796	\$0	\$1,822,444	\$25,564,750
2	State Distribution to Special Service Districts	\$216,541	\$167,563	\$484,112	\$0	\$183,503	\$1,051,719	\$3,217,821
3	State Distribution to Counties - Community Impact Fund	\$59,000	\$980,000	\$1,532,400	\$892,000	\$1,390,000	\$4,853,400	\$28,797,224
Sum of Above Distributions*		\$424,394	\$1,148,049	\$2,016,821	\$2,564,796	\$1,573,503	\$7,727,563	\$57,579,795

*Counties may benefit from additional mineral revenues distributed by other state funds/agencies.

Sources:

1 - Spreadsheets provided November 2004 by Kevin Anderson, Financial Manager, Utah Department of Transportation. Also available at <http://www.dot.utah.gov/index.php/m=c/tid=135> (accessed November 2004).

2 - Spreadsheets provided November 2004 by Arthur Peterson, HCD Accountant, Utah Department of Community and Economic Development.

3 - Utah Department of Community and Economic Development, Division of Community Development. Legislative Report of the Permanent Community Impact Fund. Reports for FYs 2001–2004 used.

The State of Utah assesses the value of natural resource properties: specifically oil and gas wells, metal mines, coal mines, sand and gravel mines, and nonmetal mines. County treasurers then set and collect taxes from these properties. On public lands, the taxes are based on the higher of (a) the value of equipment on the site or (b) discounted cash flow from production if the well or mine is producing. Table 3-36 shows the natural resource property tax amounts collected by the five counties in the planning area in 2003 for all lands. A breakdown for BLM lands only is not available. Natural resource properties are a significant source of tax revenue for local government, totaling \$1.3 million in the five-county area in 2003. This represents 5% of all property taxes collected by local government (real and personal property taxes, taxes on utility and natural resource properties, and motor vehicle fees in lieu of taxes). Of this amount, coal mines contributed 70%, with nearly \$908,144 in taxes paid on coal mines in Sevier County, the third-highest coal-producing county in the state.

Table 3-36. Property Taxes Charged Against Natural Resource Property, 2003

Area	Oil and Gas Extraction	Metal Mines	Coal Mines	Sand and Gravel	Non-Metal Mines	Total Natural Resource Taxes	Total as Percentage of Total Property Taxes
Garfield	\$67,885	\$53,556	\$0	\$8,582	\$0	\$130,023	3.2%
Piute	\$0	\$7,446	\$0	\$0	\$1,557	\$9,003	1.4%
Sanpete	\$212	\$347	\$0	\$22,113	\$24,165	\$46,837	0.5%
Sevier	\$0	\$477	\$908,144	\$21,429	\$186,229	\$1,116,279	11.0%
Wayne	\$0	\$0	\$0	\$1,131	\$2,499	\$3,630	0.3%
Total-Study Area	\$68,097	\$61,826	\$908,144	\$53,255	\$214,450	\$1,305,772	5.1%

Source: Utah State Tax Commission 2004

A source of local government revenue directly attributable to the public lands in each of the counties is Payments In Lieu of Taxes (PILT). PILT payments are made by the Federal government to compensate counties for lost property tax revenue attributed to Federal lands, which are not taxable. PILT payments are calculated with a complex formula that considers numerous factors, including acreage of eligible lands; population; and other Federal transfers, such as mineral royalties. In fiscal year 2004, PILT payments for all Federal lands in the five county socioeconomic study area totaled nearly \$2.5 million, comprising \$113,302 to Piute County, \$240,126 to Wayne County, \$428,693 to Garfield County, \$724,561 to Sanpete County, and \$951,083 to Sevier County (USDI 2004). These payments cannot be readily attributed to BLM versus other Federal lands.

3.6.2.2.4 Mineral Economics

The mineral industries produce direct and indirect labor earnings that circulate throughout the socioeconomic study area. Mining is a cyclical industry, and there have been times in the past when mineral development has played a smaller role in the economy of the socioeconomic study area than at the present time. Coal production is at record levels, and there is continuing activity in mining of aggregate, salt, and gypsum. Mining and mining-related employment makes a significant contribution to Sevier county. There are undeveloped mineral resources located throughout the socioeconomic study area. Development of these resources is dependent on economic and other factors within and outside the area.

The main mineral production in the socioeconomic study area is the coal resource within Sevier County. Sevier County is the third-highest producer of coal in Utah and contains the highest-producing coal mine

in the state: the SUFCO Mine in Convulsion Canyon. Between 1984 and 2001, coal production rose and fell somewhat from year to year, with a low production value of \$67.1 million in 1992 and a high production value of \$108.5 million in 2001 (BLM 2003b).

Oil production in the five county area (Sevier, Garfield and Sanpete counties are the only producing counties) generated nearly \$5 million in sales in 2001 (BLM 2003b). Gas production, which occurs only in Garfield and Sanpete counties, is associated with the production of oil and generated \$33,764 in sales in 2001 (BLM 2003b). The production in Sanpete County is from one well that has minor production on an intermittent basis. Production in Garfield County is primarily oil at the Upper Valley field in the western part of the county, outside the planning area. The Covenant field in the Sevier Valley is the newest discovery of oil in the State and has increased production of oil in the State by 10%. The discovery of oil at the Covenant field has increased interest in leasing and exploration in the western part of the planning area. It should be noted that Garfield County's oil and gas production occurs in the western part of the county, outside the planning area. Recent drilling in the Sevier Valley area could lead to increased exploration and development within the planning horizon. Increased leasing activity has occurred in the Sevier-Sanpete Valley.

3.6.2.2.5 Grazing Economics

The farm sector, which includes grazing on public lands, provided 2,508 jobs in the five county area throughout 2000. Although this number is marginally higher than numbers for 1980 and 1990, total employment in the farm sector has dropped from nearly 16% in the area in 1980 to nearly 10% in 2000 (BLM 2003b). Total earnings in the farm sector were reported as approximately \$38.6 million during 2000, or 7.2% of total earnings in the five county area (BLM 2003b). These figures result in an average yearly income of \$15,385 for jobs in the farm sector. Total numbers of cattle in the five county area have remained mostly constant over the past 14 years, whereas the number of sheep has declined by more than 35% (BLM 2003b).

Within the RFO, the number of permitted AUMs available for livestock grazing has been constant at 109,951 since at least 1988. An AUM is a standardized measure of the amount of forage necessary for the sustenance of one cow unit or its equivalent (e.g., five sheep) for one month. Active use, as represented by the number of AUMs licensed (purchased) yearly, has increased from a low of nearly 38,000 in 1990 to a high of nearly 76,600 in 2001. The discrepancy between permitted AUMs and active AUMs can be attributed to the variability of range conditions year-to-year, fluctuations of prices in the livestock markets, individual permittees taking voluntary nonuse, or combinations of the three. BLM grazing fees rose to their highest point (\$1.98 per AUM) in the mid-1990s but quickly declined and have held steady at or near the base rate of \$1.35 per AUM through 2004. The number of livestock operators using BLM lands managed by the RFO has increased steadily, from a low of 120 in 1990 to a high of 148 in 1999 (BLM 2003b).

Calculation of the value of livestock grazing within the RFO is based on the 10-year average of active AUMs (see the livestock grazing section of this chapter). Active AUMs in this period averaged 50,827 for cattle and 9,756 for sheep. The average value of production per AUM in 2003 dollars for the State of Utah is \$41.22 for cattle AUMs, and \$22.93 for sheep AUMs, based on the methodology described in the Socioeconomic Baseline Report. Applying these values to the active AUM figures shows that the average value of production for livestock grazing within the RFO in recent years is about \$2.1 million per year for cattle and \$223,700 for sheep in 2003 dollars (Table 3-37). Combined with information on livestock production across the entire five county socioeconomic study area (BLM 2003b, USDA 2004; both updated to 2003 dollars), these data show that 1.5% of the \$154.2 million 10-year annual average of cash receipts for livestock and livestock products in the five county socioeconomic study area can be attributed to grazing on BLM lands. However, this small figure may not reflect the full significance of grazing on

BLM lands: for instance, this grazing could be critical to certain operators at certain times of the year when other forage or feed is unavailable or expensive.

Table 3-37. Value of Grazing Output on Richfield Field Office Public Lands

Stock Type	Active (Licensed) AUMs*	Estimated Value of Production per AUM (2003\$)*	Value of Grazing Output (2003\$)
Cattle	50,827	\$41.22	\$2,095,100
Sheep	9,756	\$22.93	\$223,700
Total	60,583		\$2,318,800

Notes: 10-year Average 1994-2003
Source: USDA 2004.

3.6.2.2.6 Recreation and Tourism Economics

Recreation visitation to the five county socioeconomic study area has declined in the past several years, mirroring trends for the state and nation. Figures from the Utah Division of Travel Development (2004) indicate visitation to most area state and national parks peaked in 1999 and in most cases has declined steadily through 2002 (Grand Staircase-Escalante National Monument, minus 41%; Yuba State Park, minus 22% since peak in 2000; Capitol Reef National Park, minus 23%; Glen Canyon National Recreation Area, minus 20%; Canyonlands National Park, minus 16%; Goblin Valley State Park, minus 13%; Palisade State Park, minus 5% since peak in 2000). Despite these visitation declines, recreation and tourism-related sectors have the greatest potential for growth among sectors that use public land resources. Long-term increases in recreation visits are likely a result of projected state and regional population growth and an aging population that will demand increased opportunities for leisure and recreation.

Employment and earnings provided by recreation and tourism are typically within the service and retail sectors, although not all employment and earnings from these sectors can be directly attributed to tourism and recreation. The Utah Division of Travel Development (2004) estimates that there were 2,979 travel and tourism-related jobs in the five-county area in 2003. According to the Division, 44% of total employment in Garfield County in 2003 occurred in tourism-related jobs. Figures for this measure for other counties are as follows: Wayne County, 26%; Piute County, 17%; Sevier County 17%; and Sanpete County, 7%. For all five counties, the *2007 Economic Report to the Governor* (Utah Governor's Office of Planning and Budget 2007) estimates that 15.4% of all jobs (in 2005) were in the leisure and hospitality industries; this is more than double the percentage for Utah as a whole (7.3%). The Division estimates that travelers spent a total of \$92 million in the five county area in 2003, resulting in \$1.9 million in tax revenues to local governments.

Recreation participation and visitor days (12 hours of participation in any recreational activity) for the lands managed by the RFO for fiscal years 2001 through 2004 are detailed in Table 3-22. For the fiscal year ending September 30, 2004, the greatest number of recreationists participated in driving for pleasure (132,195), camping (105,128), picnicking (81,055), hiking/walking/running (66,189), and OHV/ATV use (63,834), whereas the greatest number of visitor days was spent camping (102,144), driving for pleasure (55,034), backpacking (51,610), hiking/walking/running (31,507), and using OHVs (cars/trucks/SUVs) (31,836).

3.6.3 Environmental Justice

"Environmental justice" refers to the fair and equitable treatment of individuals regardless of race ethnicity, or income level, in the development and implementation of environmental management policies and actions. In February 1994, President Clinton issued Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority and Low Income Populations." The objective of this EO is to require each Federal agency to "make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low income populations" (EO 12898, 1994).

Where the impacts of a proposed Federal action may involve such populations, an analysis of the potential for disproportionate impacts and meaningful community outreach and public involvement is required.

3.6.3.1 Minority Populations

BLM Instruction Memorandum (IM) 2002-164, "Guidance to Address Environmental Justice in Land Use Plans and Related NEPA Documents," provides policy and guidance for addressing environmental justice in BLM land use planning. IM 2002-164 defines minority persons as "Black/African American, Hispanic, Asian and Pacific Islander, American Indian, Eskimo, Aleut and other non-white persons." Further, IM 2002-164 indicates that an area should be considered to contain a minority population where either the minority population of the affected area exceeds 50%, or the percentage of minority population in the affected area is meaningfully greater than the percentage in the general population.

Populations of the five counties encompassed within the socioeconomic study area are predominately Caucasian and non-Hispanic. All five counties have a larger proportion of Caucasian residents than does the state. Table 3-38 provides a summary of population by race and ethnicity in 2004.

**Table 3-38. Racial and Ethnic Groups for Richfield Planning Area Counties and Utah
(Percent of Population)**

Race or Ethnicity	Garfield County	Piute County	Sevier County	Sanpete County	Wayne County	State of Utah
Caucasian persons	97.4%	98.4%	97.0%	96.6%	99.0%	93.8%
African American persons	0.2%	0.1%	0.3%	0.5%	0.2%	0.9%
American Indian/Alaska Native	1.8%	1.2%	1.8%	1.0%	0.3%	1.3%
Asian	0.4%	0.1%	0.3%	0.7%	0.0%	1.9%
Native Hawaiian, or Pacific Islander	0.0%	0.0%	0.1%	0.7%	0.3%	0.7%
Persons reporting two or more races	0.2%	0.1%	0.5%	7.6%	0.2%	1.3%

Race or Ethnicity	Garfield County	Piute County	Sevier County	Sanpete County	Wayne County	State of Utah
Persons of Hispanic or Latino origin	3.3%	5.0%	2.8%	7.6%	2.6%	10.6%
White persons, not Hispanic	94.5%	93.7%	94.5%	89.4%	96.4%	83.8%

Source: U.S. Census Bureau, 2004.

Notes:

¹Detail may not add up to 100% due to rounding

²Hispanic breakout is separate because Hispanics can be of any race.

³Figures for Garfield County represent the entire county, not just the portion within the planning area.

As Table 3-38 shows, the percentage of minority residents does not exceed 50% of the total population in any of the five counties in the socioeconomic study area. Thus, none of the five counties contain a minority population that is meaningfully greater than the general population.

3.6.3.2 Low-Income Populations

With respect to low-income populations, IM 2002-164 indicates that low income populations can be identified according to poverty thresholds published by the US Census Bureau. In addition, the IM notes that "when considering these definitions, it is important to recognize that some low-income and minority populations may comprise transitory users of the public lands and thus not be associated with a particular geographic area."

As shown in Table 3-39, 10% of the persons living in Utah had incomes below the poverty level in 2003. Persons with incomes below the poverty level in the counties within the planning area ranged from 10% to 13.8%. For the purposes of this analysis, this was not determined to represent a substantial concentration of persons living in poverty or to be meaningfully greater than the statewide percentage.

Table 3-39. Persons below the Poverty Level for Richfield Socioeconomic Study Area by County (Percent of Population, 2003)

Income	Garfield County	Piute County	Sevier County	Sanpete County	Wayne County	State of Utah
Persons below poverty level	10.0%	13.8%	11.8%	13.5%	11.5%	10%

3.7 HEALTH AND SAFETY

3.7.1 Introduction

A major priority in land management for the RFO is ensuring health and human safety on its public lands. The BLM's goals are to effectively manage hazardous materials and safety hazards on the public lands to protect the health and safety of public land users, protect the natural and environmental resources, minimize future hazardous materials and related risks, costs and liabilities, and to mitigate physical hazards in compliance with all applicable laws, regulations, and policies. The BLM follows its national, state, and local contingency plans as they apply to emergency responses. These plans are also consistent with Federal and state laws and regulations.

3.7.2 Hazardous Materials

Hazardous materials are generally defined as a usable product or substance that may cause harm to humans, natural resources, or the environment when spilled, released, or contacted. Hazardous materials are used in every day activities and may be in the form of a solid, liquid, or gas. Regardless of their physical state, hazardous materials may be toxic, flammable, combustible, reactive, and/or corrosive. These can include, but are not limited to, discarded chemicals, chemical spills, discarded wastes, etc. Once hazardous materials are disposed of, spilled or dumped, they are classified as “hazardous waste.” Hazardous waste problems within the RFO can result from programs conducted by state and local governments, by local businesses and industries, and/or by illegal dumping of hazardous materials on lands administered by the BLM. In coordination with cooperating agencies, BLM-administered public land sites contaminated with hazardous wastes would be reported, secured, and cleaned up according to applicable Federal and state regulations and contingency plans. Parties responsible for contamination would be liable for damage assessment, removal, and restoration costs as prescribed in Federal and state regulations. Currently no hazardous waste sites listed on the National Priority List or Superfund Cleanup List exist within the RFO.

3.7.2.1 Potential Hazards

The various hazardous waste generators pose a potential impact to the health and safety of area residents, visitors, and to the physical environment itself. Both commercial and illegal activities can lead to the creation of hazardous waste sites. Spills, illegal dumping, and the discovery of abandoned hazardous materials are likely to occur within the RFO. Contaminants from these sites can pose an imminent threat to public safety and adversely impact the environment by impacting soils, ground water, air, and surface water quality. Potential hazardous waste generators within the RFO include the following: oil and gas drilling operations, natural gas pipelines, mining operations, uranium tailings, storage tanks, landfills, and illegal dumps.

3.7.2.2 Hazardous Materials Management

The RFO Hazardous Materials Program is responsible for hazardous materials handling, storage, transport, and emergency response. Several state and Federal mandates, authorities, and handbooks provide the BLM with management guidelines, objectives, and actions pertaining to hazardous materials management. The Federal and state prescribed mandates ensure the RFO’s compliance with applicable laws and regulations.

3.7.3 Abandoned Mines

The early mining practices within the planning area were subject to minimal safety and environmental regulations. Prior to 1981, the BLM did not regulate surface disturbance related to mining operations and did not have regulations for public safety in association with mining operations. Prior to 1981, mine openings such as shafts, adits, and other access to mine workings were left open in many cases when the mining operations ceased. These open, abandoned mine workings are a safety and/or health concern to the public as the workings can pose a risk of serious injury and/or toxic threat for humans. In addition, abandoned mines can contribute heavy metals and other contaminants to surface and ground water. This uncontrolled drainage can pose a health risk to humans and be a source of environmental degradation.

The BLM has conducted inventories of abandoned mine sites and some remediation, such as stabilizing sites, closing mine openings, and/or reclaiming mine-related land disturbances within the RFO. In the RFO, the areas most likely to have abandoned mine openings are in the vicinity of Marysvale and the

Henry Mountains. In the 1990s, many abandoned mines around Marysville were closed as part of Abandoned Mined Land projects as completed by the State of Utah in cooperation with the BLM; however, many abandoned mine workings are still present. The BLM and the State will continue to inventory and close abandoned sites that are a safety and/or health concern for the public and an environmental concern.

3.7.3.1 Potential Hazards

Abandoned mine sites may pose hazards to human health, the environment, and physical safety. Threats to health and the environment include: acid drainage, heavy metal contamination, metal contaminated tailings impoundments, stored chemicals, and leaking containers. Changes in the chemical composition or soil loss near abandoned mine sites can result in alterations or loss of natural habitat for native wildlife. Abandoned mines may also impact surface and ground water. The impacts to water quality are generally the result of contaminated sediments or metal salts that can affect human health, fisheries, wildlife, and vegetation. Contaminants from tailings impoundments, waste rock piles near abandoned mill sites and mine workings can become air borne or water transported and become a risk to public health. Releases of hazardous substances from waste piles and acid drainage can affect lands beyond abandoned mine sites.

Open, abandoned, underground mines are unstable; mine adits (horizontal openings at the surface) may collapse, internal supports for levels (passages within the mine) may fail, and mine shafts (vertical openings at the surface) and winzes or raises (vertical connections between mine levels) may be obstructed or unseen. Toxic or lethal air conditions may exist due to low concentration of oxygen or high concentrations of other gases. Exposure to radiation in the mine, particularly radon gas, can be a hazard, especially in abandoned uranium mines in southern Utah.

Abandoned, unreclaimed surface mines can include hazards related to physical safety. Such features could include abandoned unstable highwalls, waste dumps and other slopes, and can also include equipment.

Water can be a hazard in flooded underground mines; the water may cover and conceal sharp or other hazardous objects and winzes or raises to a lower level. Water at surface mines can also be a hazard and safety risk by concealing objects or concealing abrupt changes in surface.

Hazardous wastes, such as explosive materials and chemicals could be present. Explosive materials can be a safety hazard and can be in a deteriorated, unstable condition. Containers of chemicals can be damaged, in a state of deterioration, or otherwise leaking. Tanks, holding or processing ponds, or other fluid containment structures may have lost integrity and may allow for leakage and seepage into soils, transport by surface and ground water, or other contamination of the environment and threat to human health. Illegal dumping of hazardous wastes within abandoned mines is also a possibility.

3.7.3.2 Abandoned Mine Management/Reclamation Activities

The BLM has recently developed the Abandoned Mine Lands program (AML) that addresses the environmental and safety hazards associated with AML sites on public lands. Once the sites are identified, they are prioritized, and appropriate actions are taken on those historic mine sites that pose health and safety risks. The BLM's priority for reclamation of environmentally contaminated sites is based on risk assessments that address threats to human health and the environment. For example, abandoned mine land sites that impact water quality are usually a greater concern and receive a higher priority for reclamation than those that do not impact water quality. See Chapter 2 for AML program priorities.